TM 11-5830-202-35

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

FIELD AND DEPOT MAINTENANCE

PUBLIC ADDRESS SET AN/UIH-1

HEADQUARTERS, DEPARTMENT OF THE ARMY

MAY 1959

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the dynamotor output connections. Serious injury or death may result from contact with these terminals.

DON'T TAKE CHANCES

EXTREMELY DANGEROUS VOLTAGES EXIST IN THE FOLLOWING UNITS OF PUBLIC ADDRESS SET AN/UIH–1

DYNAMOTOR	575 volts
AUDIO FREQUENCY AMPLIFIER AM–1830/UIH	575 volts

TECHNICAL MANUAL
No. 11-5830-202-35

HEADQUARTERS,
DEPARTMENT OF THE ARMY,
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PUBLIC ADDRESS SET AN/UIH-1

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CHAPTER 1

THEORY

Section I. GENERAL THEORY

1. Scope

a. This manual covers field and depot maintenance for Public Address Set AN/UIH–1. It includes instructions appropriate to third, fourth, and fifth echelons for troubleshooting, testing, adjusting, and repairing the equipment, replacing maintenance parts, and repairing specified maintenance parts. It also lists tools, materials, and test equipment for third, fourth, and fifth echelon maintenance.

b. The complete technical manual for this equipment includes two other publications:

TM 11–5830–202–10, Public Address Set AN/UIH–1, Operator's Manual

TM 11–5830–202–20, Public Address Set AN/UIH–1, Organizational Maintenance, Second Echelon.

***c.* Forward comments concerning this manual to the Commanding Officer, U. S. Army Signal Publications Agency, Fort Monmouth, N. J.**

Note. For applicable forms and records, see paragraph 2 TM 11–5830–202–10.

2. Block Diagram Analysis

(fig. 1)

The public address set amplifies audio signals from a microphone, a telephone switchboard, or a reproducer (TM 11–5830–202–20).

a. The incoming signal is applied through the control unit. The control unit contains a built-in meter that can be used for checking the audio level of the output of the amplifier circuits or the direct current (dc) power input to the equipment.

b. The input signal to the audio amplifier is applied to input amplifier V1. Input amplifier V1 amplifies the signal and feeds it to driver V2. The driver (V2) stage produces a power level of sufficient amplitude to drive output amplifiers V3 through V6. The signal from output amplifiers V3 through V6 is applied to output transformer T3.

c. Output transformer T3 supplies the signal to any one, or all, of the following:

(1) To the control unit for measuring the overall output of the audio amplifier.

(2) To the loudspeaker for broadcasting the amplified audio signal over a given area.

(3) To an auxiliary audio amplifier (TM 11–5830–202–20) that is used to provide additional area coverage.

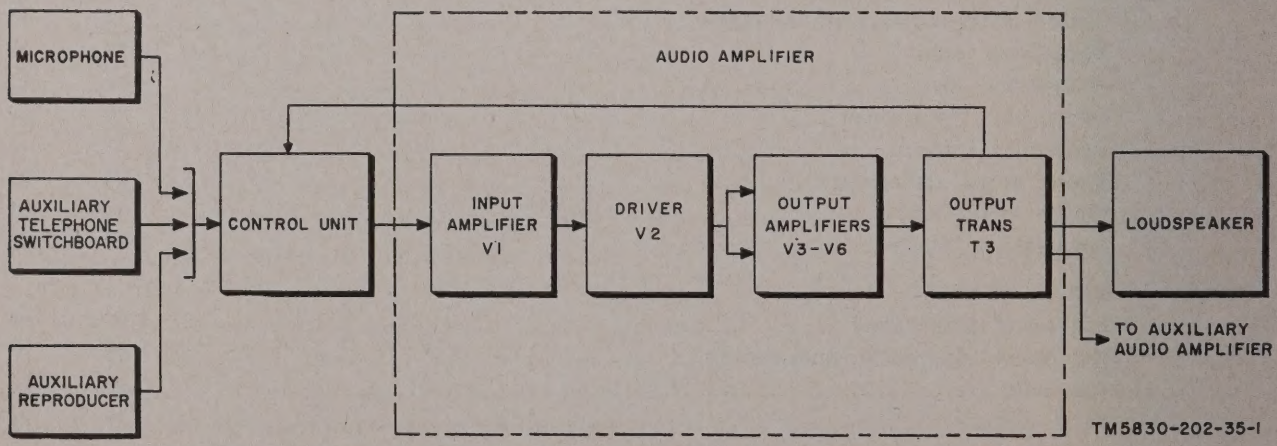


Figure 1. Public Address Set AN/UIH–1, block diagram, with input from microphone or from auxiliary signal source.

Section II. CIRCUIT ANALYSIS

3. Microphone
(fig. 13)

a. When switch S301 is pressed, operating voltage is supplied to all components and the public address set is ready for immediate use.

b. Sound energy applied to cartridge MK301 is converted to electrical energy. The electrical energy is developed as a voltage across volume control R301. The signal voltage, tapped off volume control R301, is fed through the shielded microphone cable and connector P301 to jack J102 on the control unit.

4. Control Unit
(fig. 13)

a. Signals from the microphone, the telephone switchboard, or the reproducer are applied through input jack J102 to the control unit. AMPLIFIER switch S101 or press-to-talk switch S301 (par. 3) controls the application of power to the public address set components. When the microphone is used with the equipment, AMPLIFIER switch S101 is in parallel with press-to-talk switch S301 in the microphone.

(1) Switch S101 is set in the ON position to permit the signals to be amplified by the audio amplifier (par. 5). The equipment remains energized as long as switch S101 is in the ON position.

(2) During microphone input operation, switch S101 may be set to ON to allow continuous speech into the microphone without using press-to-talk switch S301. Usually, switch S101 is in the OFF position and switch S301 controls the equipment.

b. PRESS FOR BATT VOLTS switch S102 in its normal position causes meter M101 to indicate the output level, in decibels (db), of the audio amplifier. When switch S102 is depressed, meter M101 indicates battery supply voltage (VOLTS DC).

(1) With Switch S102 in the normal position, a portion of the audio amplifier output (par. 5*e*) is applied through the meter bridge circuit to meter M101.

(*a*) The meter bridge-type rectifier circuit consists of germanium diodes CR101 and CR102 and resistors R102 and R103. The positive-going portion of the audio signal is applied to meter M101 through diode CR102, and the negative-going portion of the signal is applied through diode CR101.

(*b*) The meter thus indicates the average value of the applied signal. Meter M101 is calibrated so that a 25-watt output signal from the audio amplifier provides a 0-db indication. Therefore, a 100-watt signal from the audio amplifier will provide a +6-db meter indication.

(2) When PRESS FOR BATT VOLTS switch S102 is depressed, the dc supply voltage is applied to the meter through current-limiting resistor R101. When the meter pointer is at the red line on the face of the meter, the applied voltage is 28 volts dc.

c. LIGHT switch S103 controls the application of power to meter lamp I 101. When set to the ON position, switch S103 applies the dc voltage to meter lamp I 101, which illuminates the face of the meter.

5. Audio Amplifier
(figs. 1 and 13)

a. General. The input signal, applied through the control unit, is delivered to the audio amplifier through INPUT RECEPTACLE J3B. The signal is amplified by input amplifier V1 (*b* below), and fed to driver V2 for further amplification. The amplified signal output of driver V2 (*c* below) is applied to output (power) amplifiers V3 through V6 (*d* below) that are connected for push-pull parallel operation. Output transformer T3 (*e* below) then delivers the amplified signal to the loudspeaker through loudspeaker output jack J4. A portion of the output signal can also be tapped off a voltage divider network and supplied, through bridging output jack J7, to an auxiliary audio amplifier and loudspeaker (TM 11–5830–202–30).

b. Input Amplifier (fig. 13). Tube V1 is a twin-triode input amplifier used in two circuits (V1A and V1B). The input signal voltage is

fed through INPUT RECEPTACLE J3B to input transformer T1. The signal developed in the secondary winding of input transformer T1 appears across variable resistor R1. The variable resistor (R1) selects the desired amount of signal voltage and applies it to the control grid (pin 5) of tube V1A. The signal from the plate (pin 6) of tube V1A is fed through coupling capacitor C2 to the control grid (pin 3) of tube V1B.

(1) The connections from INPUT RECEPTACLE J3B to input transformer T1 permit either microphone, telephone switchboard, reproducer, or bridging input to the audio amplifier.

(*a*) During microphone input, the signal is applied across pins A and B of INPUT RECEPTACLE J3B. Pins A and B are connected to pins 3 and 4 of input transformer T1, providing an input impedance of 150 ohms.

(*b*) During telephone switchboard or reproducer input, the signal is applied across pins B and G of INPUT RECEPTACLE J3B. Pins B and G are connected to pins 1 and 4 of input transformer T1, providing an input impedance of 60 ohms.

(*c*) During bridging input, the signal is applied from the bridging cable (CX–4653/U) across pins B and F of INPUT RECEPTACLE J3B. Pins B and F are connected through capacitor C1 to the input of tube V1A, providing an input impedance of 20,000 ohms.

(2) Resistor R5 is the grid return resistor of tube V1B, and resistors R2 and R3 are voltage dropping resistors for the filament circuit. Unbypassed resistor R2 also develops cathode bias and provides degeneration for input amplifier V1. Resistor R4 is the plate load resistor for tube V1A, and resistor R6 is the plate load resistor for tube V1B.

c. Driver V2. The signal from the plate of tube V1B is fed through dc blocking capacitor C3 to the control grid (pin 5) of driver V2. The output of this tube is developed in the primary and then induced in the secondary of transformer T2. Resistor R7 is the grid return resistor. Resistor R8, in conjunction with the internal heater resistance of driver V2, determines the heater voltage of output amplifiers V3 through V6 (*d* below).

d. Output Amplifiers V3, V4, V5, and V6. The signal from the top section of the secondary of transformer T2 (pins 3 and 4) is fed to the control grids (pin 5) of output amplifiers V3 and V4. The signal from the bottom section of the secondary of transformer T2 (pins 4 and 5) is fed to the control grids (pin 5) of output amplifiers V5 and V6. The output amplifiers are connected for push-pull parallel operation. Tubes V3 and V4 form one parallel arrangement, and tubes V5 and V6 the other.

(1) The top section of the primary of output transformer T3 (pins 1 and 2) is the plate load for tubes V3 and V4. The bottom section of the primary of output transformer T3 (pins 2 and 3) is the plate load for tubes V5 and V6. Screen grid voltage for the output amplifier tubes is obtained from the B+ line through screen dropping resistor R11.

(2) Resistor R14 is a voltage dropping resistor in the filament circuit of the output amplifiers, and also provides cathode bias. Resistors R9 and R10 shunt the filaments of the output amplifiers to prevent excessive current flow through the filaments if one of the filaments were to open.

e. Signal Output. The output signal of tubes V3 through V6 is induced in the secondary of output transformer T3 and fed to the loudspeaker through output jack J4. Resistors R12 and R13, in the secondary of output transformer T3, form a voltage divider network which provides a portion of the output signal voltage for meter M11 in the control unit (par. 4). The output signal for bridging operation is taken from the center of the voltage divider network through bridging output jack J7.

Note. This output voltage is applied, through the bridging cable (W510), to INPUT RECEPTACLE J3B of an auxiliary audio amplifier (TM 11–5830–202–20).

6. Loudspeaker

The output signal of the audio amplifier passes through line matching transformer T201

located at the rear of the loudspeaker. The signal is applied from the secondary of transformer T201 to the driver unit (voice coil) where it is converted to sound energy.

7. Power Supply

a. Battery Boxes. Each battery box holds seven 2-volt storage cells (type BA–241/U).

(1) The storage cells are connected in series within each battery box to provide an output of 14 volts.

(2) The outputs of the battery boxes are connected in series to provide a total voltage of 28 volts.

(3) The 28 volts is applied to the audio amplifier through cable W506 and input plug P6.

b. Vehicular Power. When the equipment is set up for operation from a vehicular power source (TM 11–5830–220–20), cable W508 connects the dc voltage (24 volts) from the vehicle to input plug P6 of the audio amplifier.

c. Bias Voltage. Bias voltage for driver V2 and output amplifiers V3 through V6 is obtained from battery BT1 (type BA–234/U). The negative voltage (—45 volts) is applied to the amplifier circuits through pin 2 of terminal board TB1.

d. Dynamotor and Blower Motor. When microphone press-to-talk switch S301 is actuated (par. 3*a*), or when AMPLIFIER switch S101 is set to ON (par. 4*a*), relay K1 closes and 28 volts dc (or 24-volt vehicular supply) is applied to dynamotor D1 and blower motor MB1.

(1) The voltage is applied to dynamotor D1 through pins 1 and 3 of terminal board TB1, and to blower motor MB1 through jack J9 and plug P13.

(2) The +575-volt dc output of the dynamotor is supplied to the audio amplifier circuits through pin 4 of TB1.

(3) Circuit breaker CB1, in the input power line, protects the audio amplifier against current overloads.

(4) Thermal switch S1, in relay K1 circuit, opens when the temperature within the audio amplifier rises to 90° C. (195° F.). The open switch causes relay K1 to deenergize, opening the input power line. Switch S1 remains open until the temperature within the audio amplifier drops to 43° C. (110° F.).

(5) Capacitor C4 filters the dynamotor high voltage output.

CHAPTER 2

TROUBLESHOOTING

Section I. GENERAL TROUBLESHOOTING TECHNIQUES

Warning: **When troubleshooting or making repairs in this equipment, be extremely careful. Voltages as high as 575 volts are present internally. Use insulated test probes when making voltage measurements. Always remove the power from the equipment, and short all capacitors before touching any internal parts.**

8. General Instructions

Troubleshooting at field and depot maintenance level includes all the techniques outlined for organizational maintenance (TM 11–5830–202–20) and any special or additional techniques required to isolate a defective part. The field and depot maintenance procedures are not complete in themselves, but supplement the procedures described in organizational maintenance. The systematic troubleshooting procedure, which begins with the operational and sectionalization checks that can be performed at an organizational level, must be completed by means of sectionalizing, localizing, and isolating techniques.

9. Troubleshooting Procedures

a. General. The first step in servicing a defective equipment is to sectionalize the fault. Sectionalization means tracing the fault to a major component. The second step is to localize the fault. Localization means tracing the fault to the defective stage. Isolation means tracing the fault to the defective part responsible for the abnormal condition. Some faults, such as burned-out resistors, arcing and shorted transformers, can often be located by sight, smell, and hearing. The majority of faults, however, must be isolated by checking voltages and resistances.

b. Sectionalization. Listed below is a group of tests to aid in tracing trouble in a defective public address set. The public address set consists of five major units: the microphone, the control unit, and the audio amplifier, the loudspeaker, and the battery boxes. The first step is to locate the unit or units at fault by the following methods:

(1) *Visual inspection.* The purpose of visual inspection is to locate faults without testing or measuring circuits. All meter indications or other visual signs should be observed and an attempt made to sectionalize the fault to a particular unit.

(2) *Operational tests.* Operational tests frequently indicate the general location of trouble. In many instances, the tests will help in determining the exact nature of the fault. The equipment performance checklist (TM 11–5830–202–20) is a good operational test.

c. Localization and Isolation. The tests below will aid in locating and isolating the trouble. First, localize the trouble to a single stage or circuit, and then isolate the trouble within that circuit by voltage, resistance, and continuity measurements. Use the following methods of trouble localization:

(1) *Signal tracing.* Signal tracing will help in isolating a trouble to a specific circuit at fault.

(2) *Voltage and resistance measurements.* These measurements will help isolate the individual component part at fault. Use resistor and capacitor color codes (figs. 11 and 12) to find the value of the components. Use the voltage and resistance diagrams (figs. 2 and 3) to find normal readings, and compare them with readings taken.

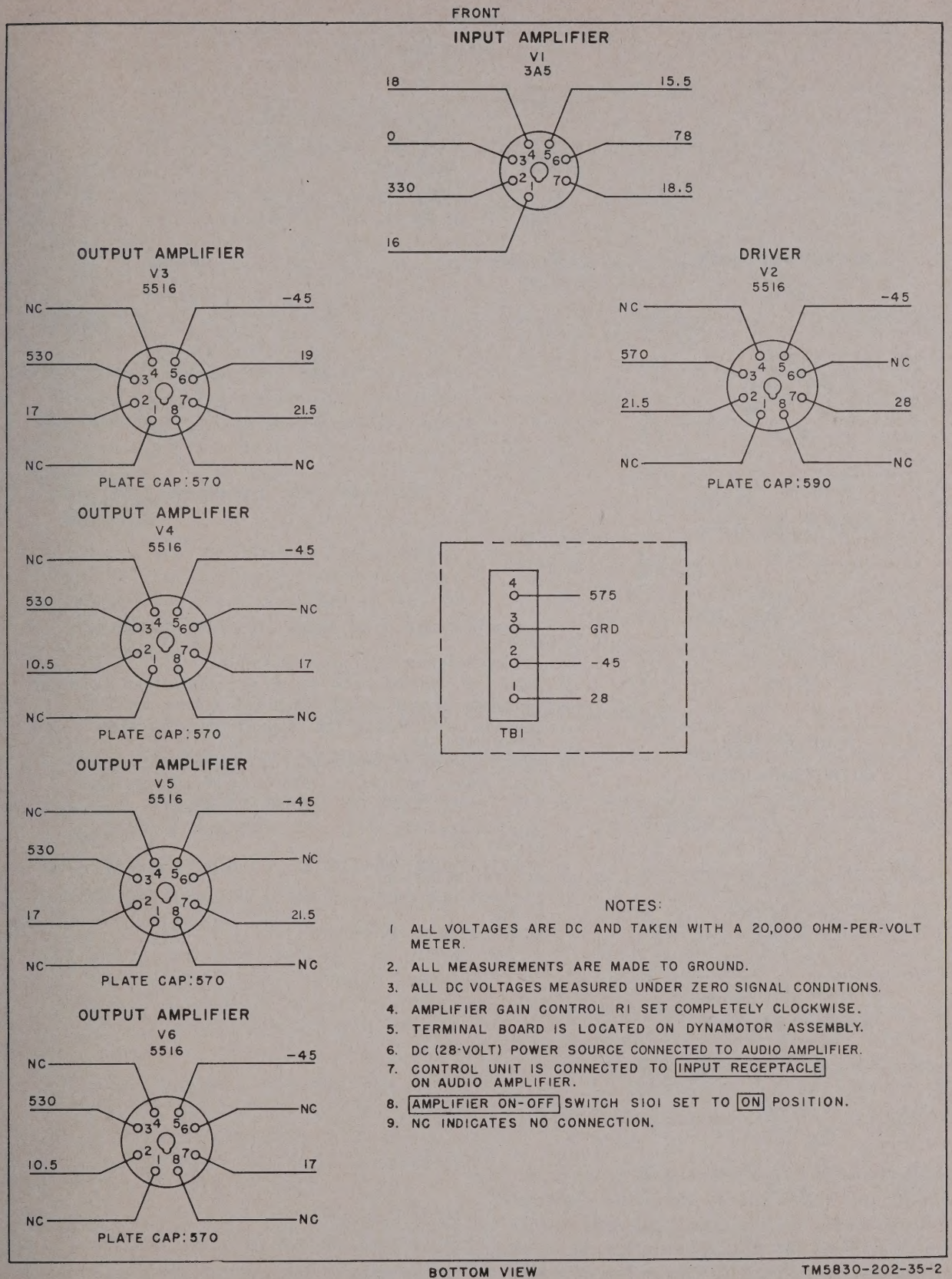
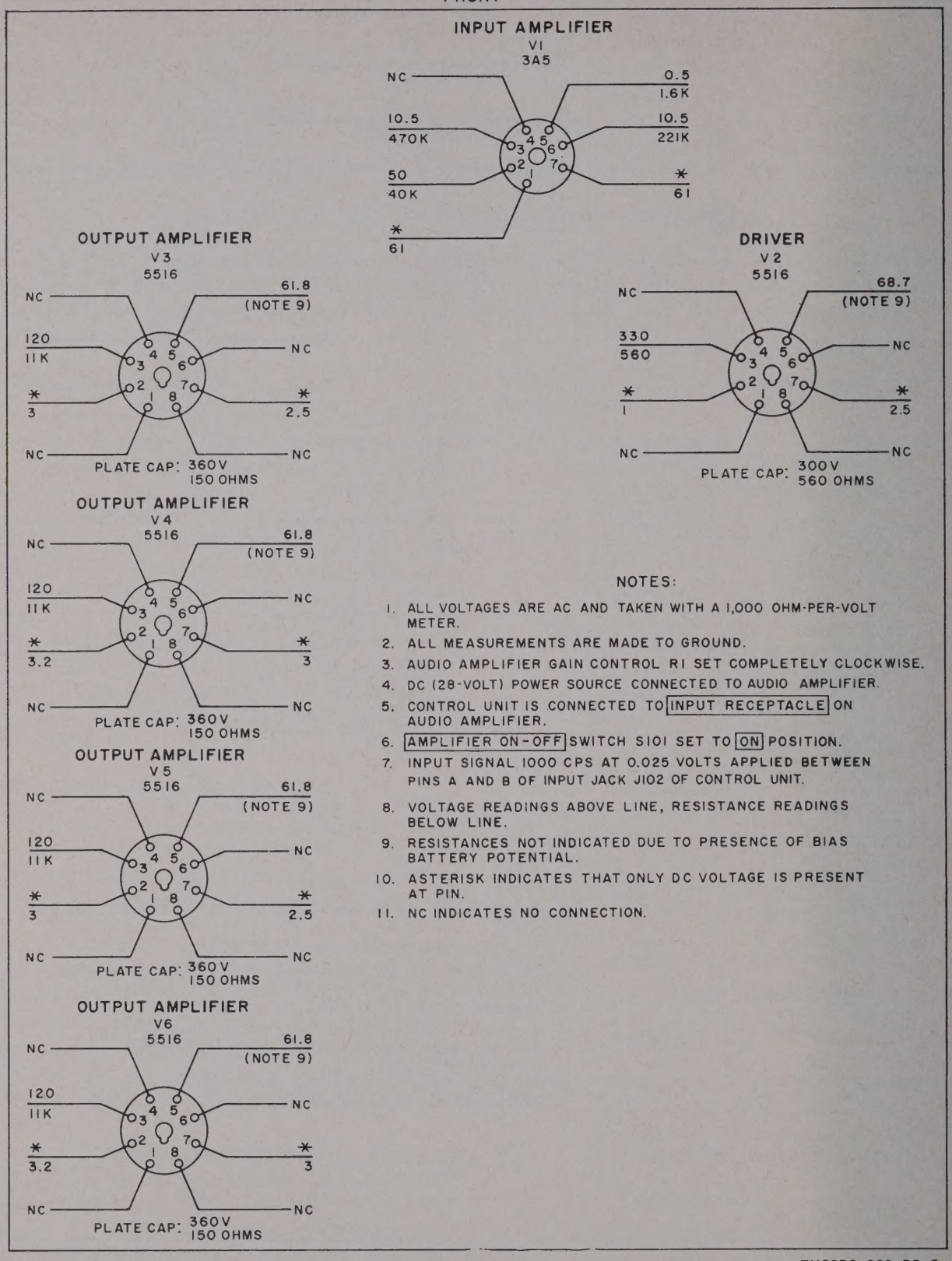


Figure 2. Audio amplifier, dc voltage diagram.

FRONT



NOTES:

1. ALL VOLTAGES ARE AC AND TAKEN WITH A 1,000 OHM-PER-VOLT METER.
2. ALL MEASUREMENTS ARE MADE TO GROUND.
3. AUDIO AMPLIFIER GAIN CONTROL R1 SET COMPLETELY CLOCKWISE.
4. DC (28-VOLT) POWER SOURCE CONNECTED TO AUDIO AMPLIFIER.
5. CONTROL UNIT IS CONNECTED TO [INPUT RECEPTACLE] ON AUDIO AMPLIFIER.
6. [AMPLIFIER ON-OFF] SWITCH S101 SET TO [ON] POSITION.
7. INPUT SIGNAL 1000 CPS AT 0.025 VOLTS APPLIED BETWEEN PINS A AND B OF INPUT JACK J102 OF CONTROL UNIT.
8. VOLTAGE READINGS ABOVE LINE, RESISTANCE READINGS BELOW LINE.
9. RESISTANCES NOT INDICATED DUE TO PRESENCE OF BIAS BATTERY POTENTIAL.
10. ASTERISK INDICATES THAT ONLY DC VOLTAGE IS PRESENT AT PIN.
11. NC INDICATES NO CONNECTION.

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Figure 3. Audio amplifier, ac voltage and resistance diagram.

(3) *Troubleshooting chart.* The trouble symptoms listed in the chart (par. 12*c*) will aid in isolating the trouble to a component part.

(4) *Stage-gain chart.* The stage-gain chart (par. 14) will help to locate a defective stage or circuit.

(5) *Intermittent troubles.* In all these tests, the possibility of intermittent troubles should not be overlooked. If present, this type of trouble often may be made to appear by tapping or jarring the equipment. Check the wiring and connections to the units of the set.

(6) *Signal substitution.* Signal substitution (par. 13) procedures enable the repairman to localize a trouble quickly to a stage, and often to a part.

10. Tools, Test Equipment, and Materials Required

a. Tools and Test Equipment. The following chart lists the tools and test equipment required for troubleshooting the public address set. The associated technical manuals and the assigned common names are also listed.

Test equipment	Technical manual	Common name
Audio Oscillator TS–382A/U.	11–2684A	Audio oscillator
Electronic Multimeter TS–505/U.	11–5511	Vtvm
Multimeter AN/URM–105.	-------	Multimeter
Multirange Instrument Shunt MX–1471/U.	-------	Shunt
Electron Tube Test Set TV–2/U (5th echelon only).	-------	Tube tester
Electron Tube Test Set TV–7/U.	11–5083	Tube tester
Tool Equipment TE–113.		

b. Materials. The following materials are required:

(1) Cleaning Compound (Federal Stock No. 7930–395–9542).

(2) Grease, aircraft and instrument (GL).

Section II. UNIT TROUBLESHOOTING

Caution: **Do not remove or replace parts before reading the instructions in paragraph 17.**

11. Checking Filament and B+ Circuits for Shorts

a. When to Check. When any of the following conditions apply, check for short circuits and clear the troubles before applying power.

(1) When the audio amplifier is being serviced apart from the other units of the public address set and the nature of the trouble symptoms are not known.

(2) When trouble symptoms from operational tests indicate possible power supply troubles; items 1, 2, and 3 of the equipment performance checklist (TM 11–5830–202–20).

b. Conditions for Tests. To prepare for the short-circuit tests, perform the following steps:

(1) Remove the upper and lower covers of the audio amplifier.

(2) Disconnect bias battery plug P8 from the bias battery (fig. 11, TM 11–5830–202–20).

(3) Remove the four leads from terminal board TB1 (fig. 16). Be sure to tag the leads for identification. Leave all other leads connected to the terminal board.

(4) Disconnect the blower motor cable from the upper cover (par. 22*a* and *b*).

(5) Remove all tubes from the audio amplifier chassis (TM 11–5830–202–20).

(6) Turn the gain control (R1) fully clockwise.

c. Measurements. Make the resistance measurements indicated in the following chart. If abnormal results are obtained, make the additional isolating checks outlined. When the faulty part is found, repair the trouble before applying power to the unit.

Short-circuit tests

Points of measurement	Normal indication	Isolating procedure
Between terminals 1 and 3 (fig. 2) of terminal board TB1.	220 ohms	Make resistance measurements of all components in filament circuit (figs. 13 and 16) and correct trouble.
Between pin 1 of tube V1 and ground (fig. 4).	150 ohms	Make resistance measurements of all components in filament circuit and correct trouble.
Between pin 7 of V1 and ground.	320 ohms	Make resistance measurements of all components in filament circuit and correct trouble.
Between terminals 3 and 4 of terminal board TB1.	Infinite resistance	Make resistance measurements of the B+ circuit. Remove and replace (in turn) each high voltage lead at its destination, starting with the plate connection of tube V1A and working toward the output amplifiers. Check resistance after each wire is removed until trouble is located.
Between terminals 2 and 4 of terminal board TB1 (fig. 2).	Infinite resistance	Make resistance measurements in B+ circuit and correct trouble.

12. Localizing Troubles

a. General. Procedures are outlined in the following chart for localizing troubles to a stage and part (figs. 4, 5, and 6) in the public address set. Depending on the nature of the operational symptoms, one or more of the localizing procedures will be necessary. When use of the procedures results in localization of trouble to a particular stage, but not to a particular part, refer to paragraphs 13, 14, and 15.

b. Use of Chart. The troubleshooting chart supplements the equipment performance checklist (TM 11–5830–202–20). Perform the procedures outlined in the troubleshooting chart (*c* below). If no operational symptoms are known, refer to the equipment performance checklist (TM 11–5830–202–20).

Caution: **If operational symptoms are not known, or they indicate the possibility of short circuits within the audio amplifier, check the electron tubes and make the short-circuit checks (par. 11) before applying power to the equipment.**

c. Troubleshooting Chart.

Item	Indication	Probable trouble	Procedure
1	Pressing press-to-talk switch S301 does not cause dynamotor and/or blower motor to operate.	Defective wiring to switch S301	Check wiring (fig. 16) and repair.
		Defective wiring to dynamotor and/or blower motor.	Check wiring (fig. 13) between switch S301 and inoperative component.
		Circuit breaker CB1 defective	Check and replace circuit breaker CB1 (fig. 4).
		Press-to-talk switch S301 defective.	Repair or replace switch S301 (par. 18*a*–*d*).
		Switch S1 defective	Replace switch S1 (fig. 4).
		Relay K1 defective	Replace relay K1 (fig. 4).
2	Volume control R301 does not vary output, or no output from audio amplifier.	Defective wiring to volume control R301.	Check wiring (fig. 14) and repair.
		Volume control R301 defective	Check and replace R301 (par. 18*e*).
		Microphone cartridge MK301 defective.	Replace MK301 (par. 18*d*).

Item	Indication	Probable trouble	Procedure
3	AMPLIFIER switch S101 in ON position; dynamotor and/or blower motor do not operate.	Defective wiring to AMPLIFIER switch S101.	Check wiring (fig. 15) and repair.
		AMPLIFIER switch S101 defective.	Check and replace switch S101 (fig. 6).
4	Meter M101 indicates zero for both positions of PRESS FOR BATT VOLTS switch S102.	Defective wiring in meter M101 circuit.	Check wiring (fig. 15) and repair.
		PRESS FOR BATT VOLTS switch S102 defective.	Check and replace S102 (fig. 6).
		Meter M101 defective	Replace meter M101 (par. 19*a*).
5	Needle of meter M101 *pegs* when PRESS FOR BATT VOLTS switch S102 is in normal (up) position.	Resistor R102 or R103 defective	Check for and replace defective resistor R102 or R103 (fig. 6).
		Diode CR101 or CR102 defective	Check for and replace defective diode CR101 or CR102 (par. 19).
6	Meter lamp I 101 does not light with LIGHT ON-OFF switch S102 in ON position.	Defective wiring in LIGHT ON-OFF switch S103 circuit.	Check and repair wiring (fig. 15).
		LIGHT ON-OFF switch S103 defective.	Check and replace switch S103 (fig. 6).
7	Filament of tube V1 does not light.	Tube V1 defective	Check tube V1.
		Defective wiring in tube V1 filament circuit.	Check and repair wiring (fig. 16).
		Resistor R2 or R3 open	Check for and replace defective resistor R2 or R3 (fig. 4).
8	Filaments of tubes V2 through V6 do not light.	Defective wiring in filament circuit.	Check and repair wiring (fig. 16).
		Resistor R8 and/or R14 open	Check for and replace defective resistor R8 or R14 (fig. 16).
9	No output from audio amplifier except with bridging input.	Transformer T1 defective	Check and replace transformer T1 (fig. 4).
		INPUT RECEPTACLE J3B defective.	Check and replace receptacle J3B (fig. 16).
10	No output from audio amplifier with bridging input.	Capacitor C1 defective	Check and replace capacitor C1 (fig. 4).
		Source of bridging signal defective.	Troubleshoot signal source.
11	No output from bridging output jack J7.	Bridging output jack J7 defective	Check and replace jack J7 (fig. 16).
		Resistor R12 or R13 open	Check for and replace defective resistor R12 or R13 (fig. 16).
12	No output, other than hum, from either bridging output jack J7 or loudspeaker.	Defective B+ circuit	Check B+ circuit (par. 11).
		One or more defective tube stage	Check for defective stage by signal substitution (par. 13).
13	No output from either bridging output jack J7 or loudspeaker.	Open B+ circuit	Check B+ circuit (par. 11) and repair.
		Defective dynamotor	Check and replace dynamotor (TM 11–5830–202–20).
		One or more defective tube stage, or defective components.	Check for defective stage or defective components by signal substitution (par. 13).

13. Signal Substitution Chart

The signal substitution tests (*b* below) will aid in localizing trouble to a stage in the audio amplifier.

a. General Instructions.

(1) Short pin D of INPUT RECEPTACLE J3B (fig. 4) to pin B (ground).

(2) Connect the audio amplifier to a source of power (TM 11–5830–202–20).

(3) Connect Audio Oscillator TS–382A/U to a source of power, and adjust its output to 1,000 cycles per second (cps) at maximum output.

b. Procedure. Connect the audio oscillator to the points indicated in the chart below. After the first test is performed, connect the loudspeaker to the audio amplifier.

(2) Connect the audio amplifier to a source of power (TM 11–5830–202–20).

(3) Connect Audio Oscillator TS–382A/U to a surce of power.

(4) Apply power to the equipments and allow a 5-minute warmup period.

b. Procedure.

(1) Connect the output of the audio oscillator to pins A and B of INPUT RECEPTACLE J3B.

(2) Adjust the output of the audio oscillator to 1,000 cps at .025 volt.

(3) Measure and record the voltage at the input and output of each stage, at the points indicated in the chart below:

Input signal	Connection	Possible trouble
1 kc at 10 volts	Between pins A and B of connector P204 (fig. 9).	Transformer T201 defective (par. 24*a*) or driver unit defective (par. 24*b*).
1 kc at 10 volts	Between pins 1 and 3 of transformer T3 (fig. 4). *Caution:* **To prevent damage to the audio oscillator, be sure to use a blocking capacitor in series with one of the test leads.**	Loudspeaker input cable defective (par. 24) transformer T3 defective (fig. 16).
1 kc at 10 volts	Between pins 1 and 2 of transformer T2 (fig. 4).	Transformer T2 defective, resistor R11 defective, or defective wiring in output amplifier circuit (fig. 16).
1 kc at 10 volts	Between pin 5 of driver V2 (fig. 4) and ground.	Resistor R7 defective.
1 kc at 1.2 volts	Between pin 3 (fig. 4) of input amplifier and ground.	Resistor R5 defective, resistor R6 defective, or capacitor C3 defective.
1 kc at 0.04 volt	Between pins 1 and 4 of transformer T1	Gain control R1 defective or transformer T1 defective.

14. Stage Gain Measurements (fig. 4)

Follow the procedures given in *a* and *b* below when the output of the amplifier is low or distorted.

a. General Instructions.

(1) Short pin D of INPUT RECEPTACLE J3B to pin B (ground), and turn gain control R1 to the maximum (clockwise) position.

Stage	Input measured between	Output measured between
V1A	Pins 5 of V1 and ground.	Pin 3 of V1 and ground
V1B	Pin 3 of V1 and ground.	Pin 5 of V2 and ground
V2	Pin 5 of V2 and ground.	Pin 5 of V3, V4, V5, or V6
V3, V4, V5, or V6	Pin 5 of V3, V4, V5, or V6.	Pins A and B of J4

(4) Calculate the gain of each stage by dividing the measured input voltage into the measured output voltage.

Example: Input voltage (e_i) = .5 volt
Output voltage (e_o) = 10.5 volts

$$\text{Gain} = \frac{e_o}{e^i} = \frac{10.5}{.5} = 21$$

(5) Compare the calculated gain ((4) above) with the gain given in the following chart.

Stage	Gain
V1A	21
V1B	6.5
V2	1.7
V3, V4, V5, or V6	3.7

(6) If the calculated gain (4) above) differs by more than ±10 percent from the given gain ((5) above), further isolating procedures (par. 15) are required.

15. Isolation Techniques

When the trouble has been localized to a stage, but not to a part, use the following techniques to isolate the defective part:

a. Test the tube involved (TM 11–5830–202–20).

b. Take voltage measurements (figs. 2 and 3) at the tube sockets and other points relating to the stage in question.

c. If the voltage readings are abnormal, take resistance readings (fig. 3) to isolate an open, a short circuit, and the defective part. Refer also to the dc resistances of transformers (par. 16).

d. The wiring diagrams (figs. 14, 15, and 16), the schematic diagram (fig. 13), and the troubleshooting chart (par. 12*c*) will also help to isolate the faulty part.

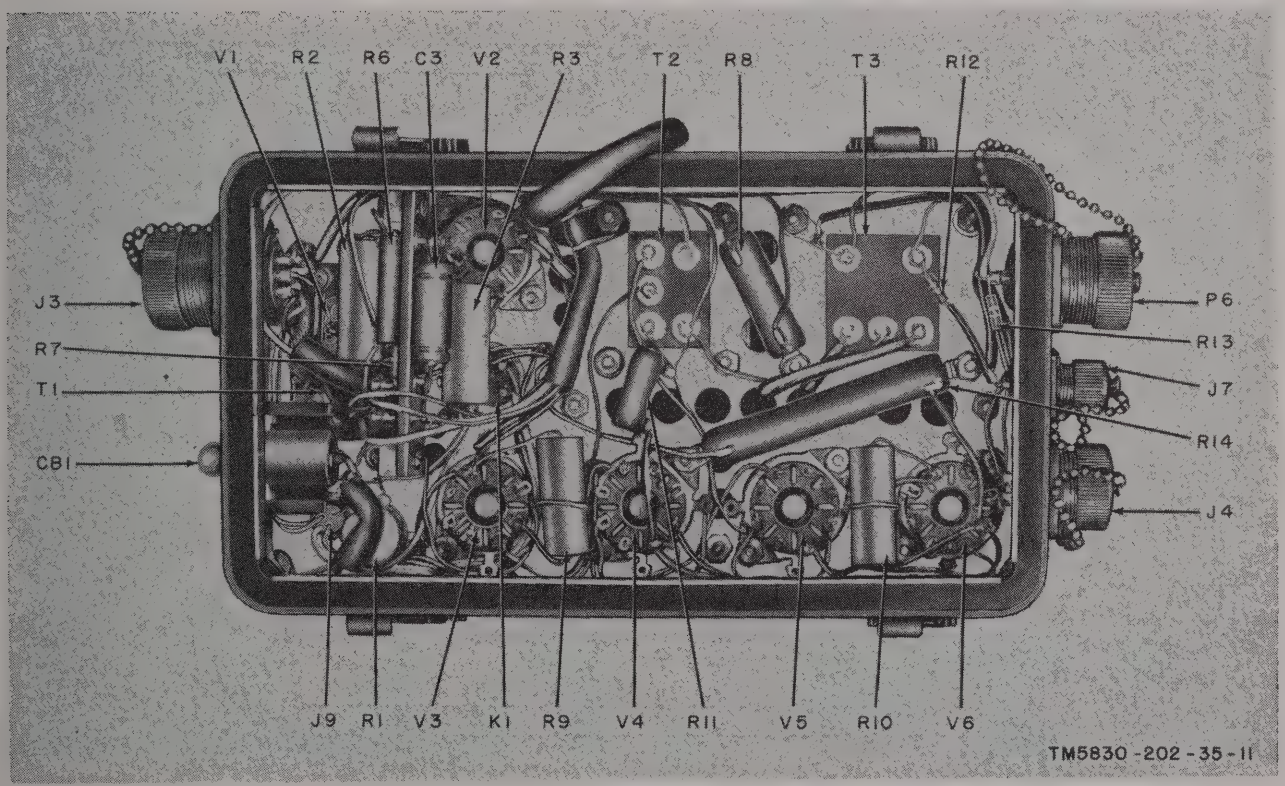


Figure 4. Audio amplifier, rear view, location of parts.

16. Dc Resistances of Transformers

The dc resistances of the transformers are listed below:

Transformer	Terminals	Resistance (ohms)
Input transformer T1____	1–2	6
	3–4	7
	5–6	1,480
Interstage transformer T2.	1–2	430
	3–4	26
	4–5	26
Output transformer T3__	1–2	24
	2–3	24
	4–5	80
Loudspeaker input transformer T201.	1–2	6
	3–4	Less than 1

CHAPTER 3

REPAIRS

17. General Parts Replacement Techniques

a. This chapter describes the disassembly, replacement, and reassembly of components of the public address set.

b. When major repair or replacement is necessary, follow the sequence of instructions given until the defective part is reached. Do not attempt to replace parts until they are completely accessible.

c. During disassembly, group the disassembled parts of each unit and tag disconnected wires to avoid confusion and facilitate reassembly.

d. Whenever the dynamotor and blower motor assemblies have been disassembled, examine each exposed part to see that it is not bent, broken, worn, or dirty.

18. Microphone Repair

(fig. 5)

Follow the procedure in *a* through *e* below for the replacement of microphone components:

a. Replacement of Press-to-Talk Switch Lever.

(1) Remove the screws (1) that hold the rear cover (2) in place.

(2) Remove the rear cover (2) from the microphone case (3).

(3) Carefully remove the lip gasket (5) and the attached switch lever (4) from the microphone case (3).

(4) Insert a replacement lip gasket (5) and switch lever (4) into the microphone case (3).

(5) Place the rear cover (2) on the microphone case (3) and secure it with the screws (1).

b. Replacement of Press-to-Talk Switch Button.

(1) Follow the procedures in *a*(1) through (3) above.

(2) Turn the actuating arm (7) 90° in either the clockwise or counterclockwise direction.

(3) Push the leaf spring (8) backward to provide access to the screws (9).

(4) Remove the screws (9) and the switch button (6).

(5) Install the replacement switch button (6) and secure it with the screws (9).

(6) Push the leaf spring (8) back to its original position.

(7) Turn the actuating arm (7) to its original position.

(8) Insert the lip gasket (5) and the switch lever (4) into the microphone case (3).

(9) Place the rear cover (2) on the microphone case (3) and secure it with the screws (1).

c. Replacement of Press-to-Talk Switch Contacts.

(1) Follow the procedures given in *a*(1) through (3) above.

(2) Tag and unsolder the lead attached to the switch contacts (10).

(3) Remove the screws (11) which hold the switch contacts (10) in place.

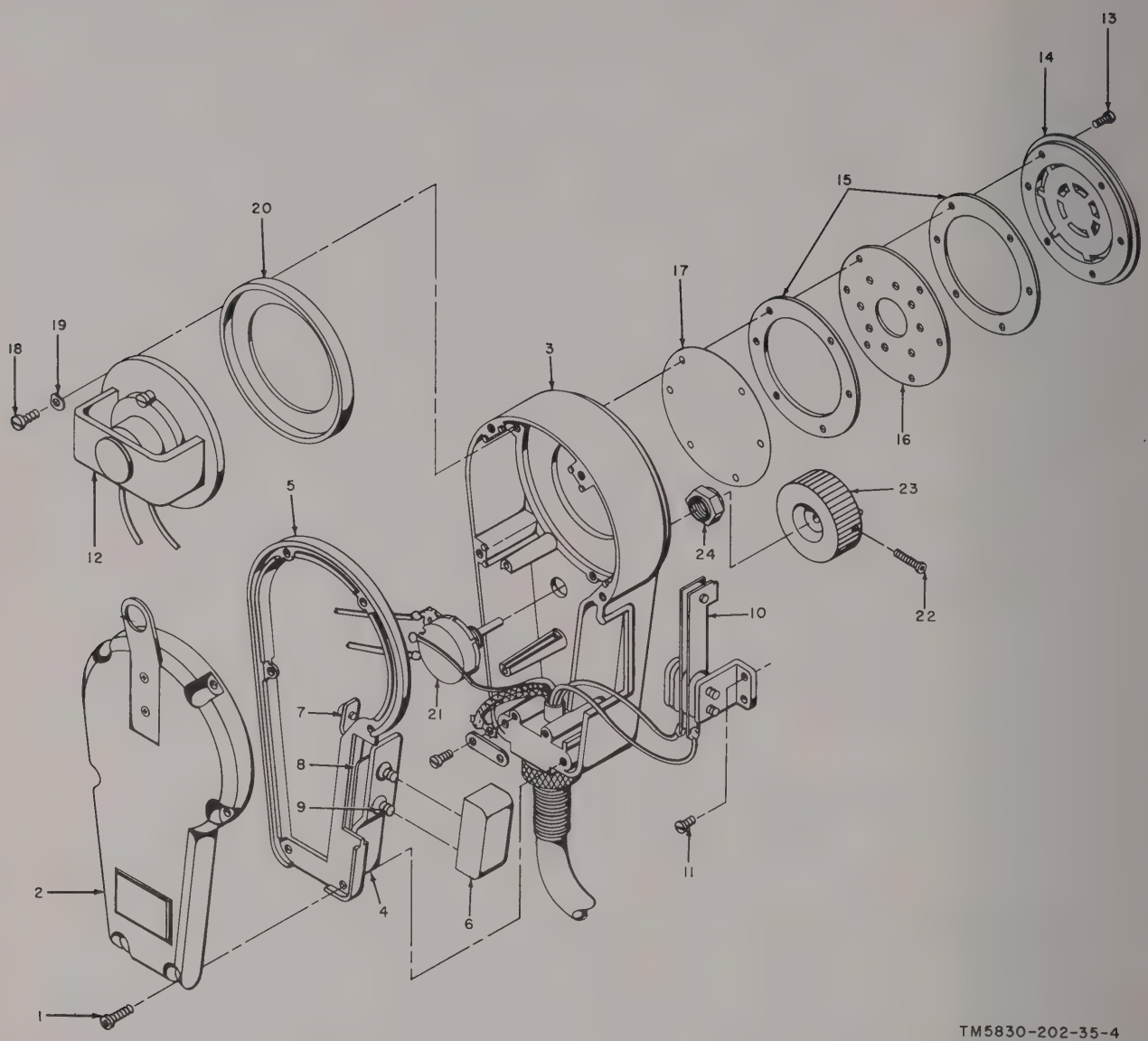
(4) Remove the switch contacts (10). (Repair or replace them.)

(5) Insert and secure the screws (11) which hold the switch contacts (10) in place.

(6) Solder the leads to the switch contacts (10).

(7) Insert the lip gasket (5) and press-to-talk switch lever (4) into the microphone case (3).

(8) Place the rear cover (2) on the microphone case (3) and secure it with the screws (1).



1 Screws, No. 4–40, ⅜ in. lg, phillips head
2 Rear cover
3 Microphone case (E301)
4 Switch lever (part of S301)
5 Lip gasket (MP302)
6 Switch button (part of S301)
7 Actuating arm (part of S301)
8 Leaf spring (part of S301)
9 Screws (part of S301)
10 Switch contacts (part (of S301)
11 Screws (part of S301)
12 Cartridge (MK301)
13 Screws, No. 2–56, 3/16 in. lg, phillips head
14 Cartridge cover
15 Washers, rubber
16 Protective disks
17 Plastic seal (MP306)
18 Screws, No. 8, thread forming
19 Washers, fiber
20 Washer, rubber
21 Volume control (R301)
22 Setscrew, No. 4–40, ¼ in. lg
23 Control knob (MP304)
24 Hexagonal nut, ¾ in. ID

Figure 5. Microphone, exploded view.

d. Replacement of Cartridge.

(1) Remove the screws (13) and the cartridge cover (14) from the front of the microphone case (3).

(2) Remove the washers (15), the protective disks (16), and the plastic seal (17) from the front of the microphone case (3).

(3) Invert the microphone case (3), and unsolder the leads attached to the cartridge (12).

(4) Remove the screws (18) and washers (19); then remove the cartridge (12) and the washer (20).

(5) Inspect the protective film over the front of the cartridge (12) for cracks or breaks. (Repair or replace the cartridge.)

(6) Seat the replacement cartridge (12) and washer (20) in the microphone case (3). Be sure that the cartridge (12) does not touch the switch contacts (10) or any metallic portion of the microphone case (3).

(7) Solder the leads to the cartridge (12).

(8) Place the washers (19) and the screws (18) in place, and tighten with moderate pressure.

(9) Replace the plastic seal (17), the protective disks (16), and the washers (15) in the front of the microphone case (3).

(10) Replace the cartridge cover (14) and secure in place with the screws (13).

(11) Place the rear cover (2) on the microphone case (3) and secure it with the screws (1).

e. Replacement of Volume Control.

(1) Loosen the setscrew (22), and remove the control knob (23) from the front of the microphone case (3).

(2) Remove the switch contacts (*c*(1)–(4) above).

(3) Tag and unsolder the leads attached to the volume control (21).

(4) Unscrew the hexagonal nut (24), and remove the volume control (21).

(5) Solder the leads to the replacement volume control (21).

(6) Tape the terminals, and then seat the volume control (21) so that the terminals do not touch any portions of the microphone case (3).

(7) Replace the hexagonal nut (24) and the control knob (23); tighten the setscrew (22).

(8) Replace the switch contacts (*c*(5)–(8) above).

19. Control Unit Repair

Instructions for replacement of the meter (M101) are given in *a* below and for the crystal diodes (CR101 and CR102) in *b* below.

a. Replacement of Meter.

(1) Open the cover of the control unit.

(2) Remove the panel retaining screws (fig. 8, TM 11–5830–202–10), and remove the front panel from the case.

(3) Tag and disconnect the meter leads (fig. 6).

(4) Remove the screws and nuts that hold the meter in place on the panel.

(5) Secure the new meter in place on the panel.

(6) Resolder the leads to the meter.

(7) Replace the panel in the case and secure it in place.

(8) Close and secure the cover.

b. Replacement of Crystal Diodes.

(1) Remove the front panel from the case (*a*(1) and (2) above).

(2) Gently grasp the leads of the crystal diode (CR101 or CR102) with metal pliers, and unsolder the lead at each end of the diode. Note the direction of the arrow on the crystal diode.

(3) Solder the leads to the ends of the replacement crystal diode. Observe the direction of the arrow ((2) above) so that polarity will be correct.

Caution: **Gently grasp the leads of the diode with metal pliers to absorb the heat from the soldering iron. Be sure that the soldering iron does not touch the glass portion of the diode. Excessive heat will damage the diode.**

(4) Follow the procedures in *a*(7) and (8) above.

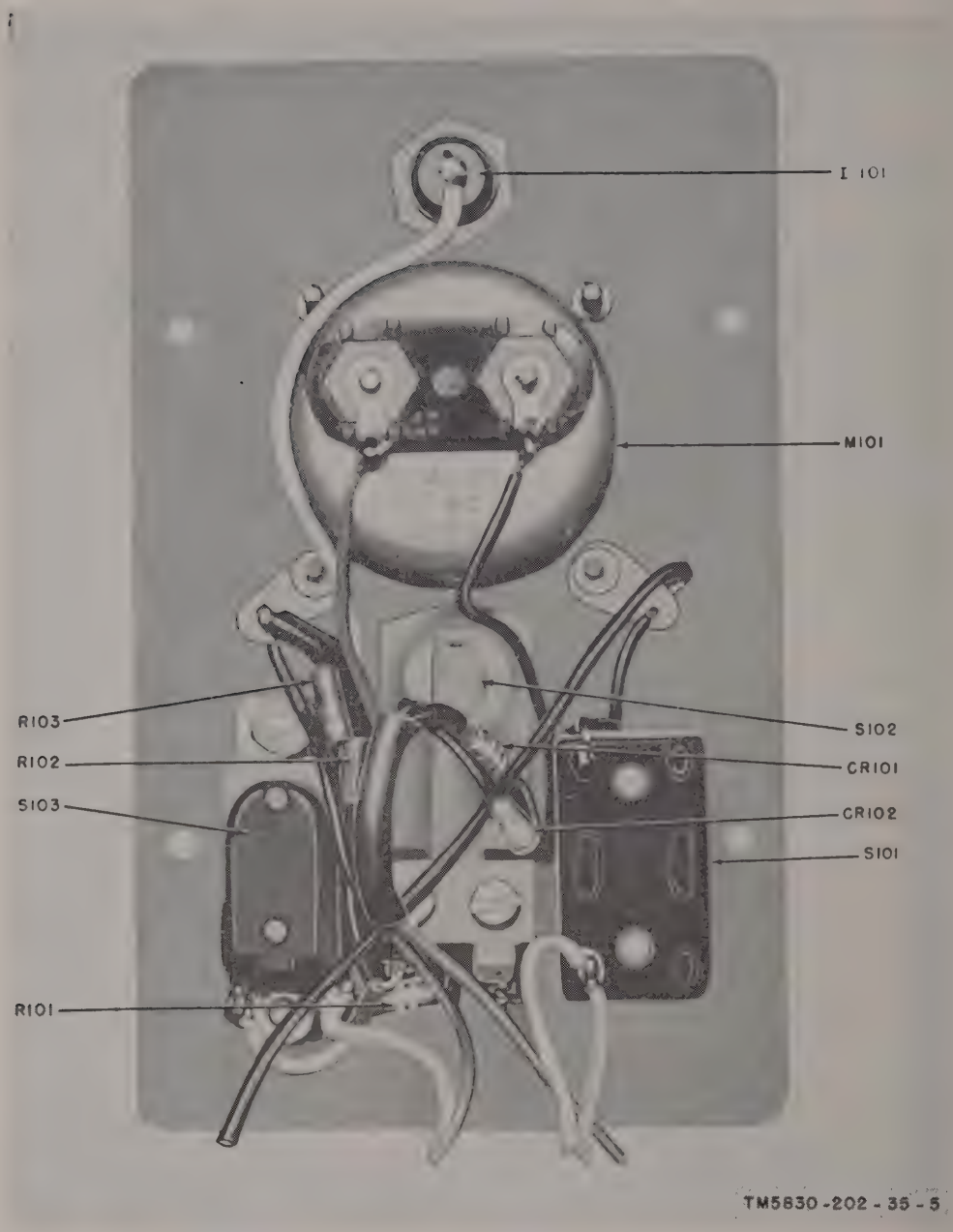


Figure 6. Control unit removed from case, rear view showing location of parts.

20. Dynamotor Replacement

a. Disassembly.

(1) Release the lower luggage catches and lift the audio amplifier chassis (fig. 9, TM 11–5830–202–20), together with the upper cover, off the lower cover.

(2) Loosen the captive screws and lift off the air baffle.

(3) Carefully turn the bottom cover upside down and remove the dynamotor assembly.

(4) Tag and disconnect the dynamotor leads from the terminal board.

(5) Invert the dynamotor assembly and remove the filter capacitor (C4) and the bias battery (BT1) (fig. 11, TM 11–5830–202–20).

(6) Remove the screws (not shown) located under the bias battery and the filter capacitor, and remove the dynamotor mounting bracket and the attached dynamotor.

b. Reassembly.

(1) Set the dynamotor mounting bracket, together with the dynamotor, in place and secure with the screws (not shown).

(2) Replace and secure the bias battery (BT1) and the filter capacitor (C4).

(3) Connect the dynamotor leads (fig. 9, TM 11–5830–202–20) to the terminal board.

(4) Place the dynamotor assembly in the bottom cover and secure the air baffle in place by tightening the captive screws.

(5) Place the upper cover together with the audio amplifier chassis on the lower cover and secure the lower luggage catches.

21. Dynamotor Repair

a. Disassembly (fig. 7).

(1) Remove the dynamotor from the audio amplifier (par. 20*a*) .

(2) Remove the screws (1) and separate the case (2) from the mounting bracket (3).

(3) Remove the nuts (4) and the lockwashers (5) from the through bolts (6); slide the through bolts out of the case (2).

(4) Tag and disconnect the leads of the field coil (17) from the end plates (9).

(5) Remove the brush holders (7) and the brushes (8) from the end plates (9). Remove the end plates (9) from the case (2).

(6) Remove the screws (10) and take off the end-plate covers (11) and the spacers (12) from the end plates (9).

(7) Slide the armature (13) from the case (2).

(8) Pry the bearings (14) and the thrust washers (15) from the armature (13).

(9) Remove the screws (16) and slide the field coils (17) out of the case (2).

b. Cleaning and Lubrication.

(1) Remove old lubricant from all parts.

(2) Clean all exposed metal parts with Cleaning Compound; dry thoroughly.

Warning: **Cleaning Compound is flammable and its fumes are toxic; provide adequate ventilation and do not use near a flame.**

(3) Apply a light coat of grease (GL) to the bearings (14).

c. Reassembly.

(1) Slide the field coils (17) into the case (2) and fasten with the screws (16).

(2) Press the thrust washers (15) and the bearings (14) onto the armature (13); place the armature inside the case (13).

(3) Fasten the spacers (12) and the end-plate covers (11) to the end plates (9) with the screws (10).

(4) Connect the leads of the field coil (17) to the end plates (9) and place an end plate at each end of the case (2).

(5) Slide the through bolts (6) through the end plates (9) and the case (2). Secure the through bolts with the lock washers (5) and the nuts (4).

(6) Replace the brushes (8) and the brush holders (7).

(7) Secure the mounting bracket (3) to the case (2) with the screws (1).

(8) Replace the dynamotor in the audio amplifier chassis (par. 20*b*).

22. Blower Motor Replacement
(fig. 8, TM 11–5830–202–20)

To replace the blower motor, proceed as follows:

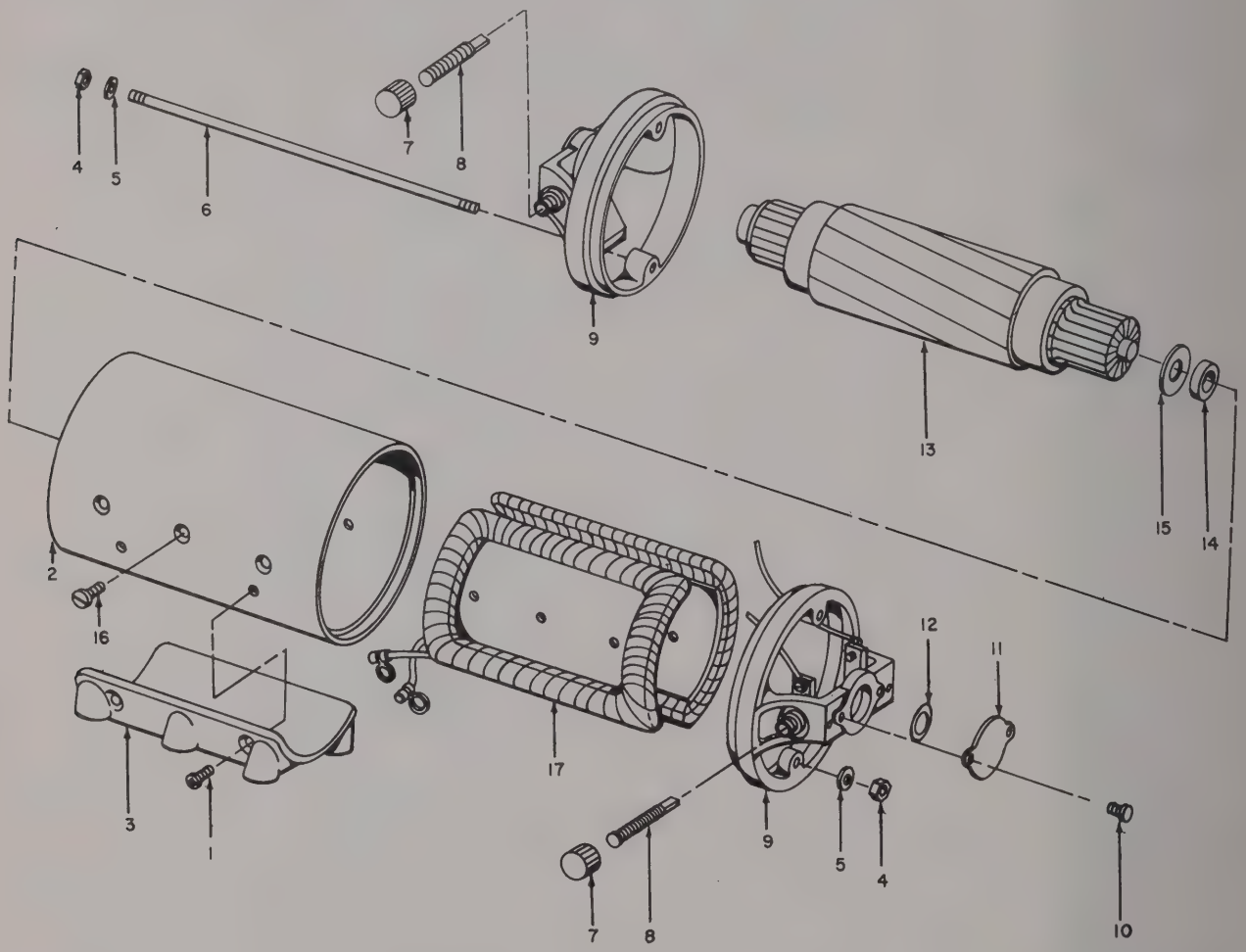
a. Release the upper luggage catches and carefully remove the upper cover.

b. Disconnect the blower motor cable from the audio amplifier chassis by releasing the twist-lock connector (P13) at the end of the cable.

c. Remove the ground terminal connections to the blower motor by removing the screw on the side of the blower motor assembly.

d. Disconnect the single lead (at the rear end of the blower motor) from the connector on the blower motor cable.

e. Remove the screws that secure the blower motor to the upper cover.



1 Screws, No. 10–32, ¼ in. lg, phillips-fillister head
2 Case (MP51)
3 Mounting bracket (MP50)
4 Nuts
5 Lockwashers
6 Through bolts
7 Brush holders (E5 and E6 for HV) or (E7 and E8 for LV)
8 Brushes (E9 and E10)
9 End plates (E37 and E38)
10 Screws
11 End-plate covers
12 Spacers
13 Armature (E15)
14 Bearings (MP17)
15 Thrust washers, fiber
16 Screws, No. 10–24, ½ in. lg, flathead
17 Field coils (E33 and E34)

Figure 7. Dynamotor, exploded view.

f. Remove the blower motor.

g. Place the new blower motor over the blower motor port. Be sure that the protective screen is set in place over the blower motor port.

h. Secure the blower motor to the upper cover.

i. Connect the single lead (at the rear end of the new blower motor) to the connector on the blower motor cable.

j. Secure the ground terminal connections to the blower motor.

k. Reconnect the blower motor cable to the audio amplifier chassis by connecting the twist-lock connector (P13) in its original position (*b above*).

l. Replace the upper cover and secure the four luggage catches.

23. Blower Motor Repair

(fig. 8)

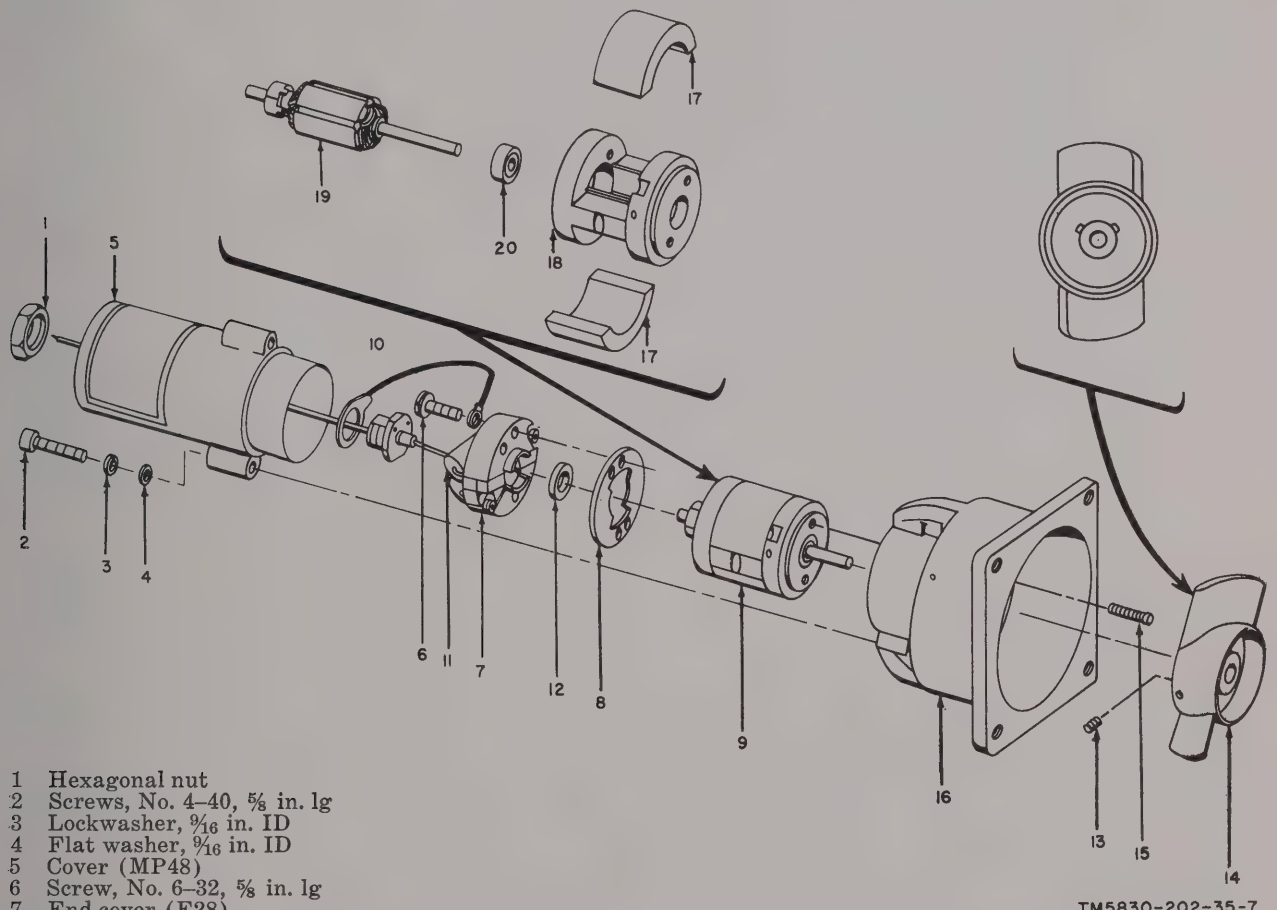
a. Disassembly.

(1) Remove the blower motor from the audio amplifier (par. 22*a–f*).

(2) Remove the hexagonal nut (1), the screws (2), the lockwashers (3), the flat washers (4) and the cover (5).

(3) Remove the screws (6) and slide the end cover (7) and the washer (8) from the motor (9).

(4) Remove the ground wire (10) from the capacitor (11) and pull the bearing (12) from the end cover (7).



1 Hexagonal nut
2 Screws, No. 4–40, 5/8 in. lg
3 Lockwasher, 9/16 in. ID
4 Flat washer, 9/16 in. ID
5 Cover (MP48)
6 Screw, No. 6–32, 5/8 in. lg
7 End cover (E28)
8 Washer (E29)
9 Motor (MP49)
10 Ground wire
11 Capacitor (C6)
12 Bearing.
13 Setscrew, No. 4–40, 1/4 in. lg, allen head
14 Fan blade assembly (MP37)
15 Screw
16 Housing (MP36)
17 Magnets (E35 and E36)
18 Motor housing
19 Armature (E16)
20 Bearing

Figure 8. Blower motor, exploded view.

(5) Loosen the setscrews (13) and remove the fan blade assembly (14).

(6) Remove the screws (15) and slide the motor (9) from the housing (16).

(7) Pry the magnets (17) from the motor housing (18) and remove the armature (19) and the bearing (20).

b. Cleaning and Lubrication.

(1) Remove old lubricant from all parts.

(2) Clean all exposed metal parts with Cleaning Compound; dry thoroughly.

(3) Apply a light coat of grease (GL) to the bearings (12 and 20).

c. Blower Motor Reassembly.

(1) Insert the bearing (20) and the armature (19) into the motor housing (18). Replace the magnets (17) on the motor housing.

(2) Slide the motor (9) into the housing (16) and secure with the screws (15).

(3) Replace the fan blade assembly (14) and tighten the setscrews (13).

(4) Place the ground wire (10) on the capacitor (11) and insert the bearing (12) into the end cover (7).

(5) Place the washer (8) on the end cover (7) and secure the end cover to the motor (9) with the screws (6).

(6) Replace the cover (5) and secure with the flat washers (4), lockwashers (3), screws (2), and the hexagonal nut (1).

(7) Replace the blower motor in the audio amplifier (par. 22*g–l*).

24. Loudspeaker Repair

(fig. 9)

To replace input transformer T201, follow the procedures in *a* below. To replace driver unit LS201, follow the procedures in *b* below.

a. Replacement of Input Transformer T201.

(1) Remove the phillips-head screws (not shown) that fasten the rear housing to the horn assembly.

(2) Lift off the rear housing that contains input transformer T201 and the cable entrance assembly.

(3) Remove the screws and the retainer band that secure the input transformer.

(4) Lift out the input transformer and tag and unsolder the leads. *Do not cut the leads.*

(5) Solder the leads to the new input transformer and place it in the rear housing.

(6) Secure the input transformer in place with the retainer band and the screws.

(7) Place the rear housing on the horn assembly and secure the housing with the phillips-head screws (not shown).

b. Replacement of Driver Unit LS201.

(1) Remove the rear housing from the horn assembly (*a*(1) and (2) above).

(2) Remove the screw (not shown) that secures the plastic disk to the rear of the driver unit; remove the plastic disk.

(3) Tag and remove the leads from the driver unit.

(4) Carefully remove the driver unit from the horn assembly by turning it clockwise.

(5) Connect the leads to the new driver unit.

(6) Insert the driver unit into the rear of the horn assembly and turn the driver unit counterclockwise to secure it in place.

(7) Replace the plastic disk in the rear of the driver unit and secure it with the screw (not shown).

(8) Replace the rear housing on the horn assembly (*a*(7) above).

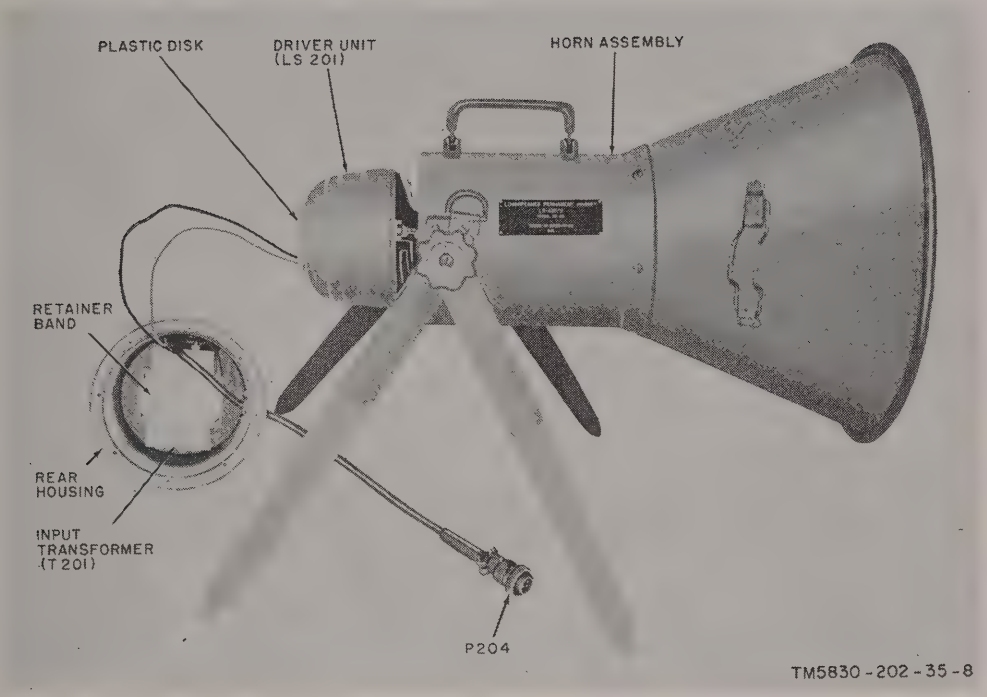


Figure 9. Loudspeaker, rear housing, and driver unit partially removed.

CHAPTER 4

FINAL TESTING

25. Purpose of Final Testing

The tests outlined in this chapter measure the performance capability of a repaired equipment. Equipment that meets the minimum standards stated in these tests will furnish satisfactory operation equivalent to that of new equipment.

26. Equipment Required for Final Testing

In addition to the tools and test equipment required for troubleshooting (par. 10*a*), the following items are required for final testing.

Item	Technical manual	Common name
Spectrum Analyzer TS–723/U.	11–5097	Analyzer
Voltmeter, Meter ME–30A/U.	11–5132	Vtvm
Resistor, 250 ohms, 100 watts, 2 ea (Federal Stock No. 5905–299–0307).		
Resistor, 150 ohms, ½ watt, 1 ea (Federal Stock No. 5905–196–7242).		

27. Test Setup

(fig. 10)

Most of the final tests will be performed under the conditions listed below (*a*–*g*). Make the connections as directed and modify them as required for a particular test.

a. Connect one end of a 150-ohm resistor to pin G of INPUT RECEPTACLE J3B of the audio amplifier. Short pin B to pin D (not shown).

b. Connect 500 ohms resistance (two 250-ohm resistors) between pins A and B of loudspeaker output jack J4.

c. Turn gain control R1 (fig. 5, TM 11–5830–202–20) to the extreme clockwise (maximum) position.

d. Connect the output of the audio oscillator (fig. 10) through the 150-ohm resistor, to INPUT RECEPTACLE J3B.

e. Connect the leads of the ME–30A/U across the output of the audio oscillator.

f. Connect the leads of the analyzer to pins A and B of loudspeaker output jack J4.

g. Connect the leads of the TS–505/U across the input of the analyzer.

h. Apply power to the audio amplifier (TM 11–5830–202–20).

i. Apply power to the test equipment; allow 5 minutes for the equipment to warm up.

28. Final Tests

a. Establishing Output Power Level.

(1) Adjust the audio oscillator output to 1,000 cps at very low output. Allow 5 minutes for the audio oscillator to stabilize.

(2) Gradually increase the output power (at 1,000 cps) until the TS–505/U indicates 224 volts root mean square (rms). This voltage will be e_1. The audio amplifier is now delivering approximately 100 watts across the 500-ohm load ($P = \frac{E^2}{R}$).

b. Calculating Gain. To calculate the overall gain of the audio amplifier, proceed as follows:

(1) Establish the output power level (*a* above).

(2) Read the voltage at the output of the audio oscillator as indicated by the ME–30A/U. This voltage will be e_2.

(3) The gain of the amplifier, as calculated by the formula $Db = 20 \log \frac{e_1}{e_2}$, should be 75 *db*.

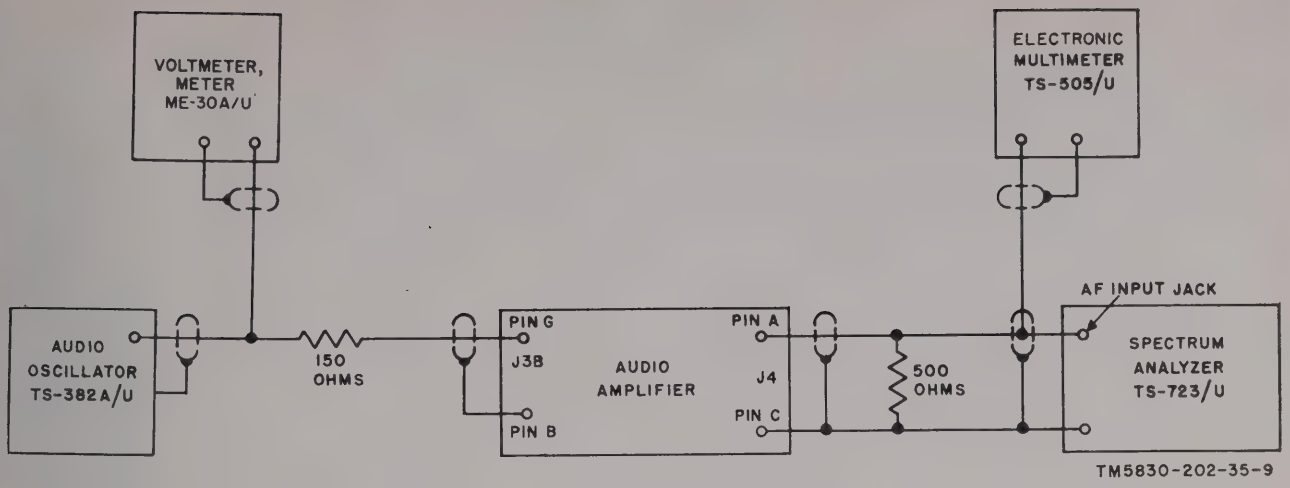


Figure 10. Test setup for final testing.

$$\textit{Example: } Db = 20 \log \frac{e_1}{e_2}$$

$$= 20 \log \frac{224}{.04}$$

$$= 20 \log 5600$$

$$= 20(3.750)$$

$$= 75$$

c. Checking Frequency Response. To check the frequency response of the audio amplifier, proceed as follows:

(1) Modify the test setup (par. 27) by replacing the TS–505/U with the ME 30A/U.

(2) Set the range selector switch of the ME–30A/U to the 100 VOLTS +DB range.

(3) Adjust the test setup for an audio amplifier output of 100 watts at 1,000 cps across the 500 ohms (*a* above).

(4) Record the decibel level as indicated on the ME–30A/U.

(5) Keep the output level of the audio oscillator constant and vary the frequency from 300 to 7,000 cps.

(6) The output should vary not more than ±1 db (from the db level recorded in (4) above) between 400 to 5,000 cps, nor drop more than 2 db (from the db level recorded in (4) above) at the extreme frequencies of 300 cps and 7,000 cps.

d. Checking Harmonic Distortion. To check the harmonic distortion present in the audio amplifier, proceed as follows:

(1) Establish the output power level (*a* above).

(2) Adjust the analyzer controls as indicated in the chart and in (*a*) through (*d*) below:

Control	Position
Meter range switch	100%
Function switch	SET LEVEL
AF–RF selector switch	AF

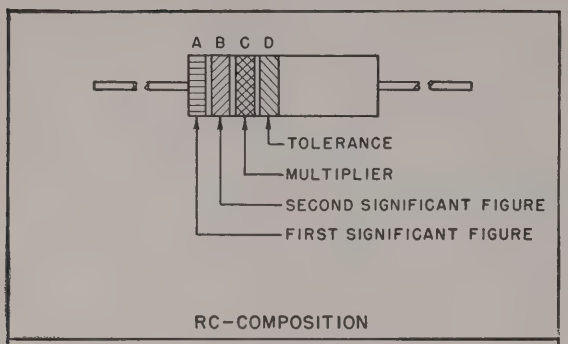
(*a*) Slowly rotate the INPUT control until the meter indicates full scale.

(*b*) Place the frequency RANGE switch in the X10 position.

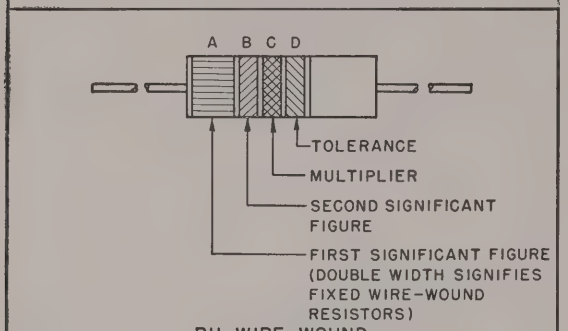
(*c*) Set the function switch to DISTORTION and adjust the FREQUENCY controls until the meter indication drops sharply.

RESISTOR COLOR CODE MARKING
(MIL-STD RESISTORS)

AXIAL-LEAD RESISTORS (INSULATED)

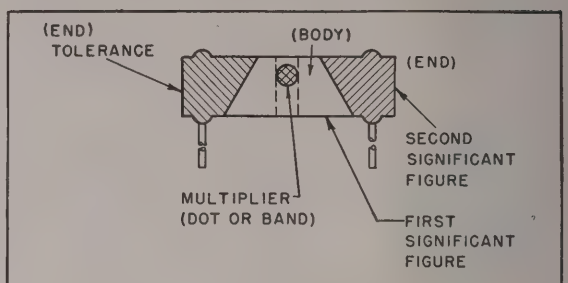


RC-COMPOSITION

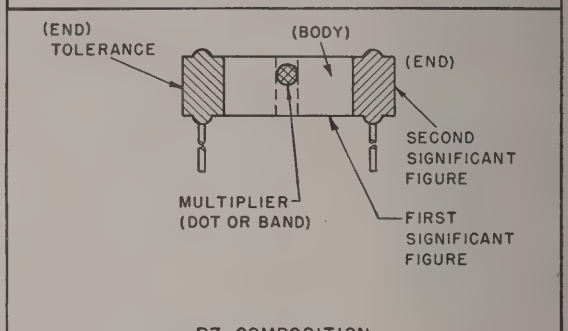


RU-WIRE-WOUND

RADIAL-LEAD RESISTORS (UNINSULATED)



RZ-COMPOSITION



RZ-COMPOSITION

RESISTOR COLOR CODE

BAND A OR BODY*		BAND B OR END*		BAND C OR DOT OR BAND*		BAND D OR END*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1	BODY	± 20
BROWN	1	BROWN	1	BROWN	10	SILVER	± 10
RED	2	RED	2	RED	100	GOLD	± 5
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000		
GREEN	5	GREEN	5	GREEN	100,000		
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	GOLD	0.1		
WHITE	9	WHITE	9	SILVER	0.01		

*FOR WIRE-WOUND-TYPE RESISTORS, BAND A SHALL BE DOUBLE-WIDTH. WHEN BODY COLOR IS THE SAME AS THE DOT (OR BAND) OR END COLOR, THE COLORS ARE DIFFERENTIATED BY SHADE, GLOSS, OR OTHER MEANS.

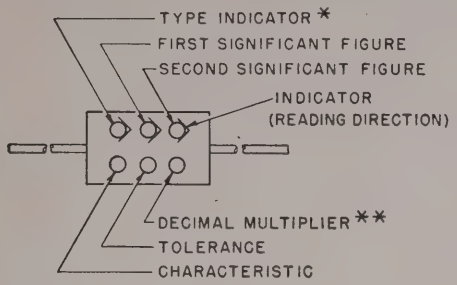
EXAMPLES (BAND MARKING):
10 OHMS ±20 PERCENT: BROWN BAND A; BLACK BAND B; BLACK BAND C; NO BAND D.
4.7 OHMS ±5 PERCENT: YELLOW BAND A; PURPLE BAND B; GOLD BAND C; GOLD BAND D.

EXAMPLES (BODY MARKING):
10 OHMS ±20 PERCENT: BROWN BODY; BLACK END; BLACK DOT OR BAND; BODY COLOR ON TOLERANCE END.
3,000 OHMS ±10 PERCENT: ORANGE BODY; BLACK END; RED DOT OR BAND; SILVER END.

STD-RI

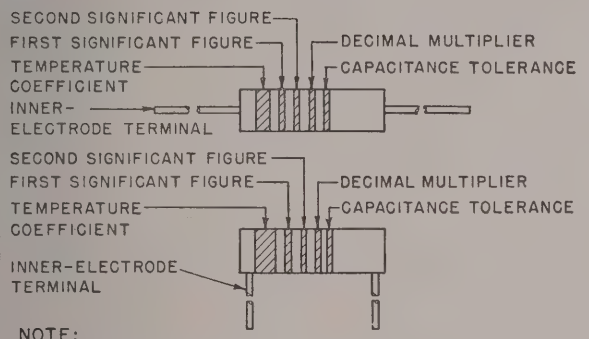
Figure 11. MIL-STD resistor color code markings.

CAPACITOR COLOR CODE MARKING
(MIL-STD CAPACITORS)



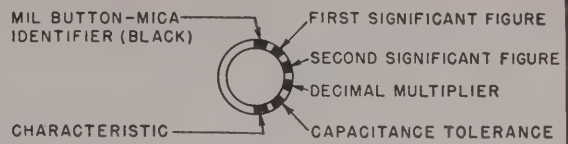
* BLACK DOT: MICA DIELECTRIC
SILVER DOT: PAPER DIELECTRIC
**INDICATES NUMBER OF ZEROS ON PAPER TYPE.

MICA (CM) AND PAPER (CN)

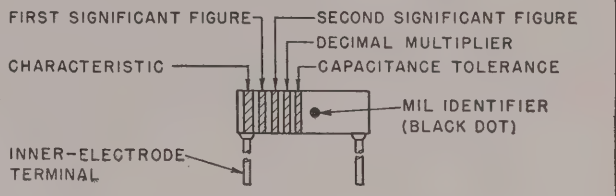


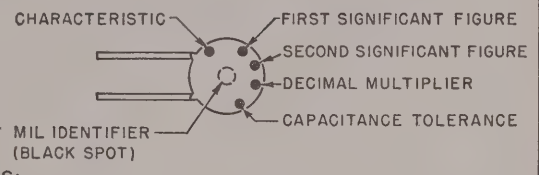
NOTE:
SPOTS MAY BE USED INSTEAD OF BANDS; TEMPERATURE COEFFICIENT MARKING IS LARGER.

CERAMIC-TEMPERATURE COMPENSATING (CC)



BUTTON-MICA (CB)





NOTES:
1. SPOTS MAY BE USED ON TUBULAR CAPACITORS; CHARACTERISTIC SPOT IS LARGER AND MIL IDENTIFIER IS ON SIDE DIAMETRICALLY OPPOSITE COLOR SPOTS.
2. MIL IDENTIFIER OF DISK TYPE IS ON REVERSE SIDE; CHARACTERISTIC SPOT IS LARGER OR SPACE BETWEEN CHARACTERISTIC AND TOLERANCE SPOTS IS THREE TIMES SPACE BETWEEN ADJACENT SPOTS.
3. TOLERANCE: YELLOW, +100%, -20%.

CERAMIC-GENERAL PURPOSE (CK)

CAPACITOR COLOR CODE

COLOR	SIG FIG.	MULTIPLIER		CHARACTERISTIC[1]				TOLERANCE[2]					TEMPERATURE COEFFICIENT (UUF/UF/°C)
		DECIMAL	NUMBER OF ZEROS	CM	CN	CB	CK	CM	CN	CB	CC		
											OVER 10UUF	10UUF OR LESS	CC
BLACK	0	1	NONE		A			20	20	20	20	2	ZERO
BROWN	1	10	1	B	E	B	W				1		-30
RED	2	100	2	C	H		X	2		2	2		-80
ORANGE	3	1,000	3	D	J	D			30				-150
YELLOW	4	10,000	4	E	P								-220
GREEN	5		5	F	R						5	0.5	-330
BLUE	6		6		S								-470
PURPLE (VIOLET)	7		7		T	W							-750
GRAY	8		8			X						0.25	+30
WHITE	9		9								10	1	-330(±500)[3]
GOLD		0.1						5		5			+100
SILVER		0.01						10	10	10			

1. LETTERS ARE IN TYPE DESIGNATIONS GIVEN IN MIL-C SPECIFICATIONS.
2. IN PERCENT, EXCEPT IN UUF FOR CC-TYPE CAPACITORS OF 10 UUF OR LESS.
3. INTENDED FOR USE IN CIRCUITS NOT REQUIRING COMPENSATION.

STD-CI

Figure 12. MIL-STD capacitor color code markings.

(*d*) Tune the BALANCE control and the FREQUENCY controls for a minimum meter indication. As tuning progresses, decrease the setting of the meter range switch to obtain a higher meter indication. Keep tuning the analyzer until no further reduction in the meter indication can be obtained.

(3) The percentage of distortion can now be read directly from the meter of the analyzer. The percentage of distortion should not exceed ±10 per cent.

Note. When the meter range switch is in the 100% position and the meter indicates .8, the percentage of distortion is 8 percent.

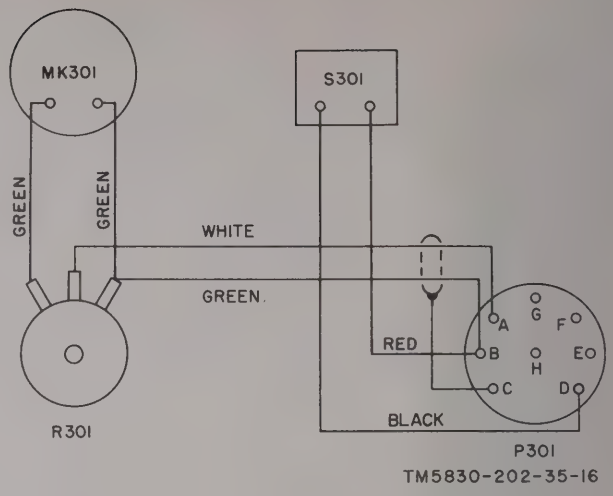


Figure 14. Magnetic Microphone M–86/U, wiring diagram.

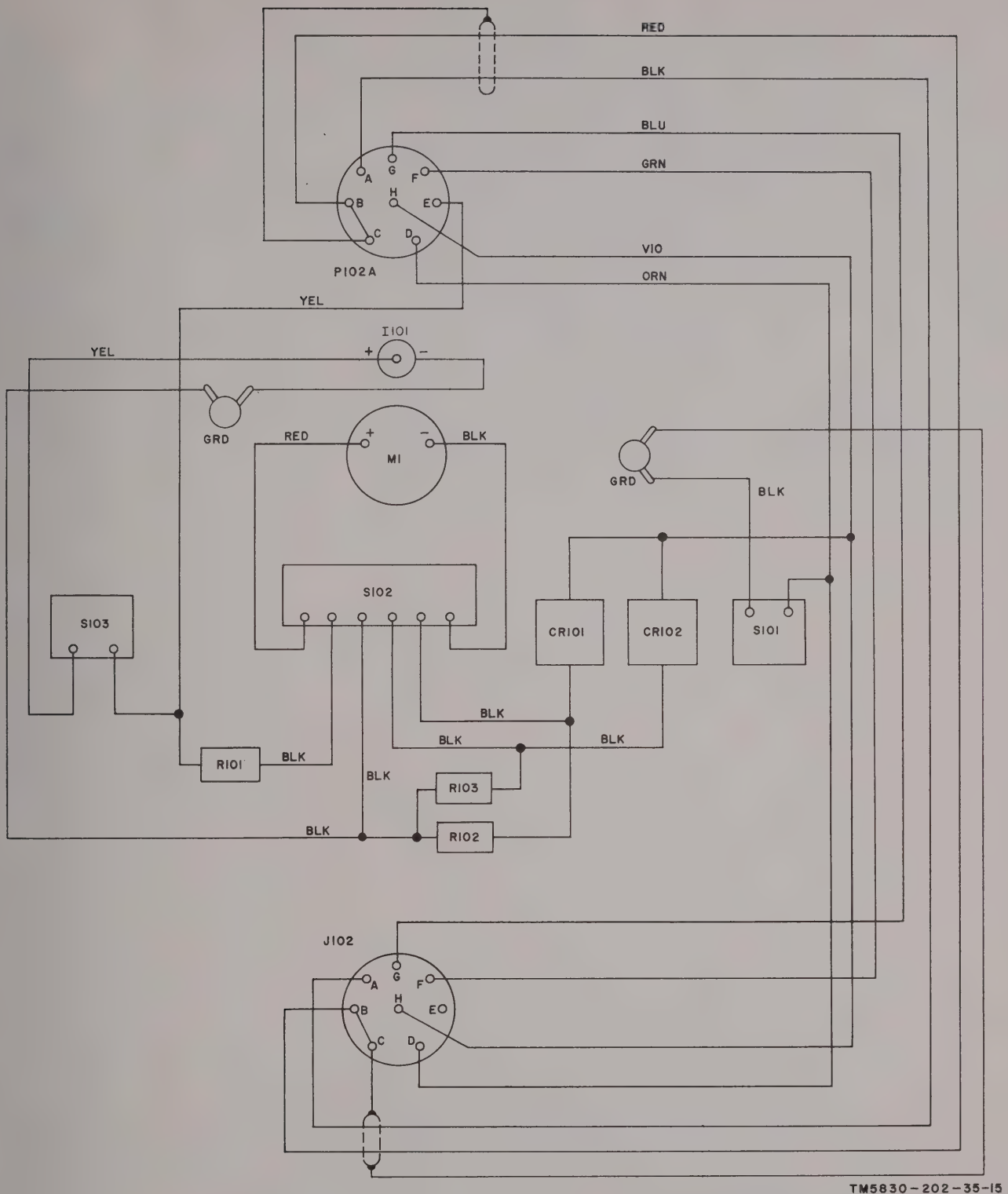
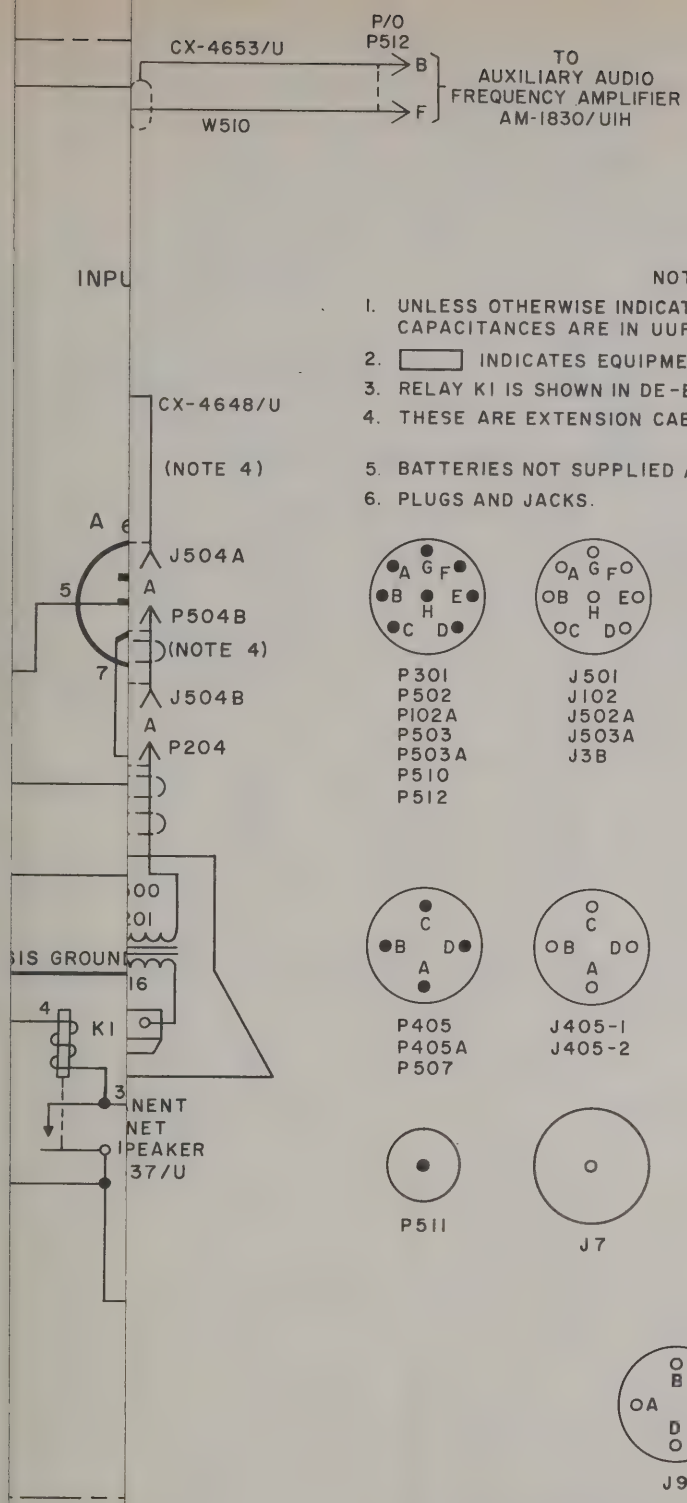


Figure 15. Public Address Set Control C–2356/UIH–1, wiring diagram.

APPENDIX I

REFERENCES

TM 11–2661	Electron Tube Test Sets TV–2/U and TV–2A/U
TM 11–2684A	Audio Oscillators TS–382A/U, TS–382B, TS–382D/U and TS–382E/U
TM 11–5083	Electron Tube Test Sets TV–7/U, TV–7A/U and TV–7B/U
TM 11–5097	Spectrum Analyzer TS–723/U
TM 11–5132	Electron Voltmeter ME–30B/U and Voltmeter, Meter ME–30A/U
TM 11–5511	Electron Multimeter TS–505/U
TM 11–5830–202–10	Public Address Set AN/UIH–1, Operator's Manual
TM 11–5830–202–20	Public Address Set AN/UIH–1, Organizational Maintenance, Second Echelon

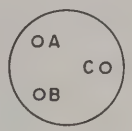


NOTES:

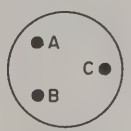
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF
2. ▭ INDICATES EQUIPMENT MARKING.
3. RELAY K1 IS SHOWN IN DE-ENERGIZED POSITION.
4. THESE ARE EXTENSION CABLES.
5. BATTERIES NOT SUPPLIED AS PART OF AN/UIH-1.
6. PLUGS AND JACKS.

P301
P502
P102A
P503
P503A
P510
P512

J501
J102
J502A
J503A
J3B



J4
J504A
J504B

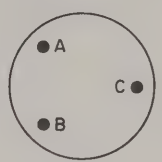


P504A
P504B
P204

P405
P405A
P507

J405-1
J405-2

J506
J508

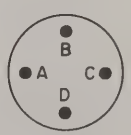


P8

P511

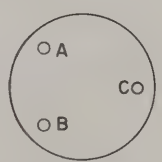
J7

P6
P509



P13

J9



J8

7. ALL CABLE ASSEMBLIES EXCEPT W506 THROUGH W508 ARE SPECIAL PURPOSE ELECTRICAL CABLE ASSEMBLIES.
8. CABLE ASSEMBLIES W506 THROUGH W508 ARE ELECTRICAL POWER CABLE ASSEMBLIES.

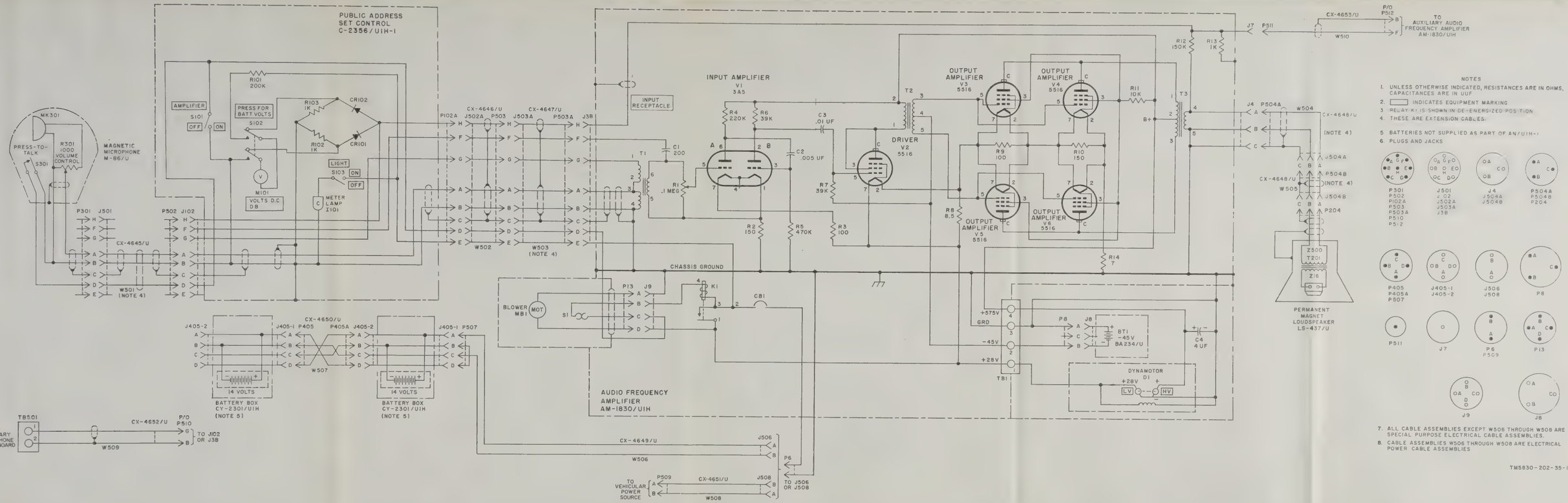
TM5830-202-35-13

Figure 13

APPENDIX I

REFERENCES

TM 11–2661	Electron Tube Test Sets TV–2/U and TV–2A/U
TM 11–2684A	Audio Oscillators TS–382A/U, TS–382B, TS–382D/U and TS–382E/U
TM 11–5083	Electron Tube Test Sets TV–7/U, TV–7A/U and TV–7B/U
TM 11–5097	Spectrum Analyzer TS–723/U
TM 11–5132	Electron Voltmeter ME–30B/U and Voltmeter, Meter ME–30A/U
TM 11–5511	Electron Multimeter TS–505/U
TM 11–5830–202–10	Public Address Set AN/UIH–1, Operator's Manual
TM 11–5830–202–20	Public Address Set AN/UIH–1, Organizational Maintenance, Second Echelon



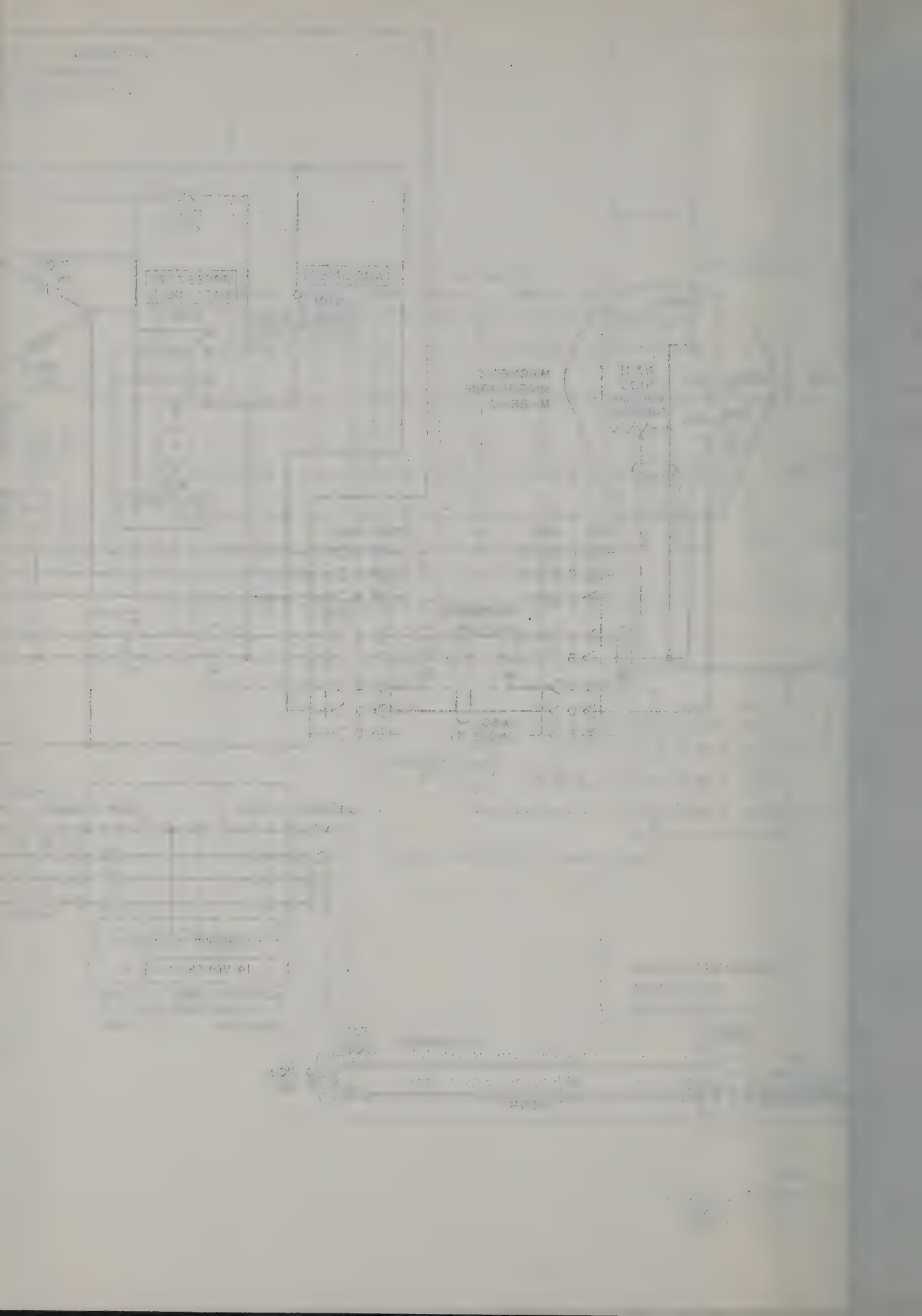
NOTES

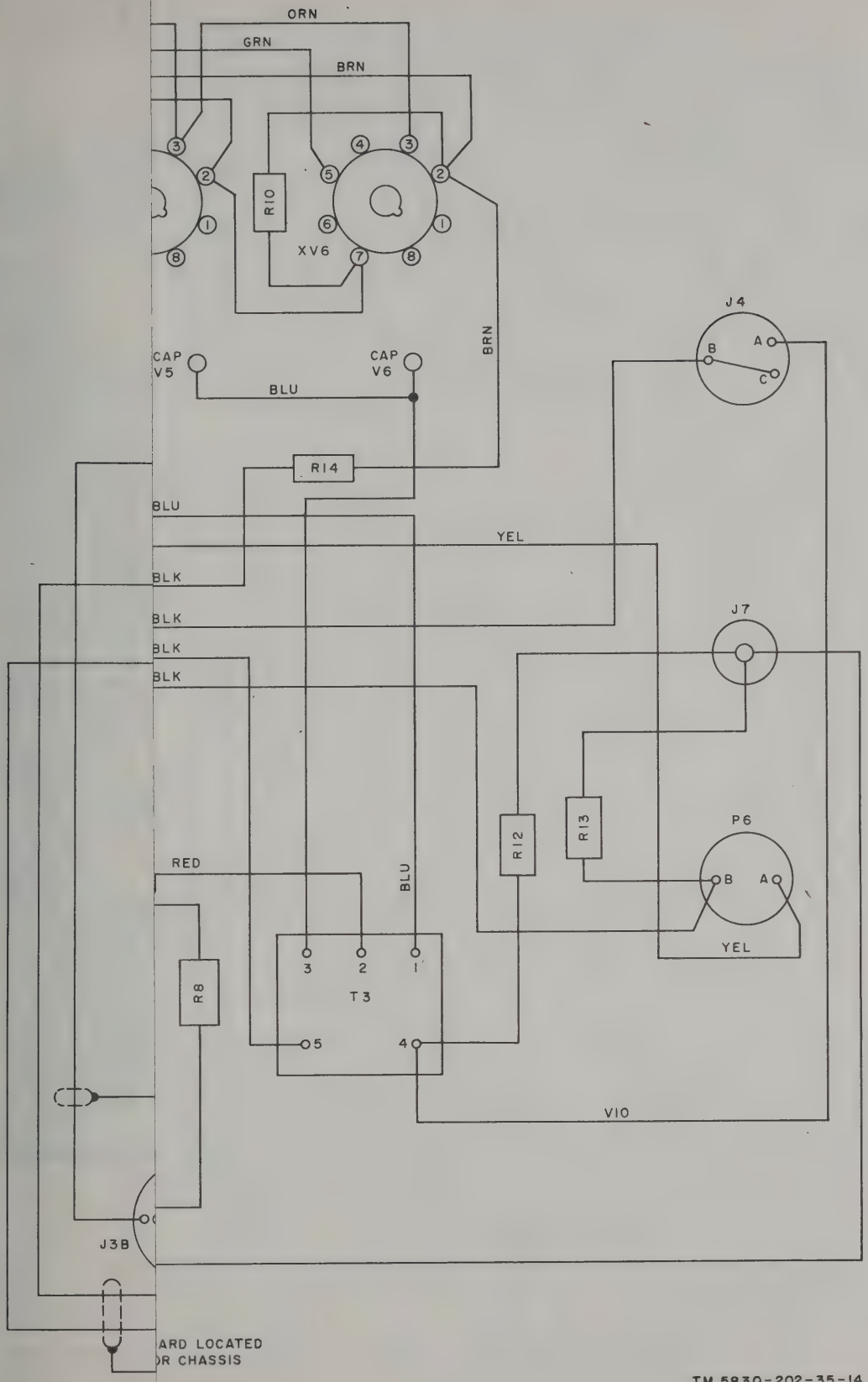
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. ▭ INDICATES EQUIPMENT MARKING.
3. RELAY K1 IS SHOWN IN DE-ENERGIZED POSITION.
4. THESE ARE EXTENSION CABLES.
5. BATTERIES NOT SUPPLIED AS PART OF AN/UIH-1.
6. PLUGS AND JACKS

7. ALL CABLE ASSEMBLIES EXCEPT W506 THROUGH W508 ARE SPECIAL PURPOSE ELECTRICAL CABLE ASSEMBLIES.
8. CABLE ASSEMBLIES W506 THROUGH W508 ARE ELECTRICAL POWER CABLE ASSEMBLIES

TM5830-202-35-13

Figure 13. Public Address Set AN/UIH-1, schematic diagram.





TM 5830-202-35-14

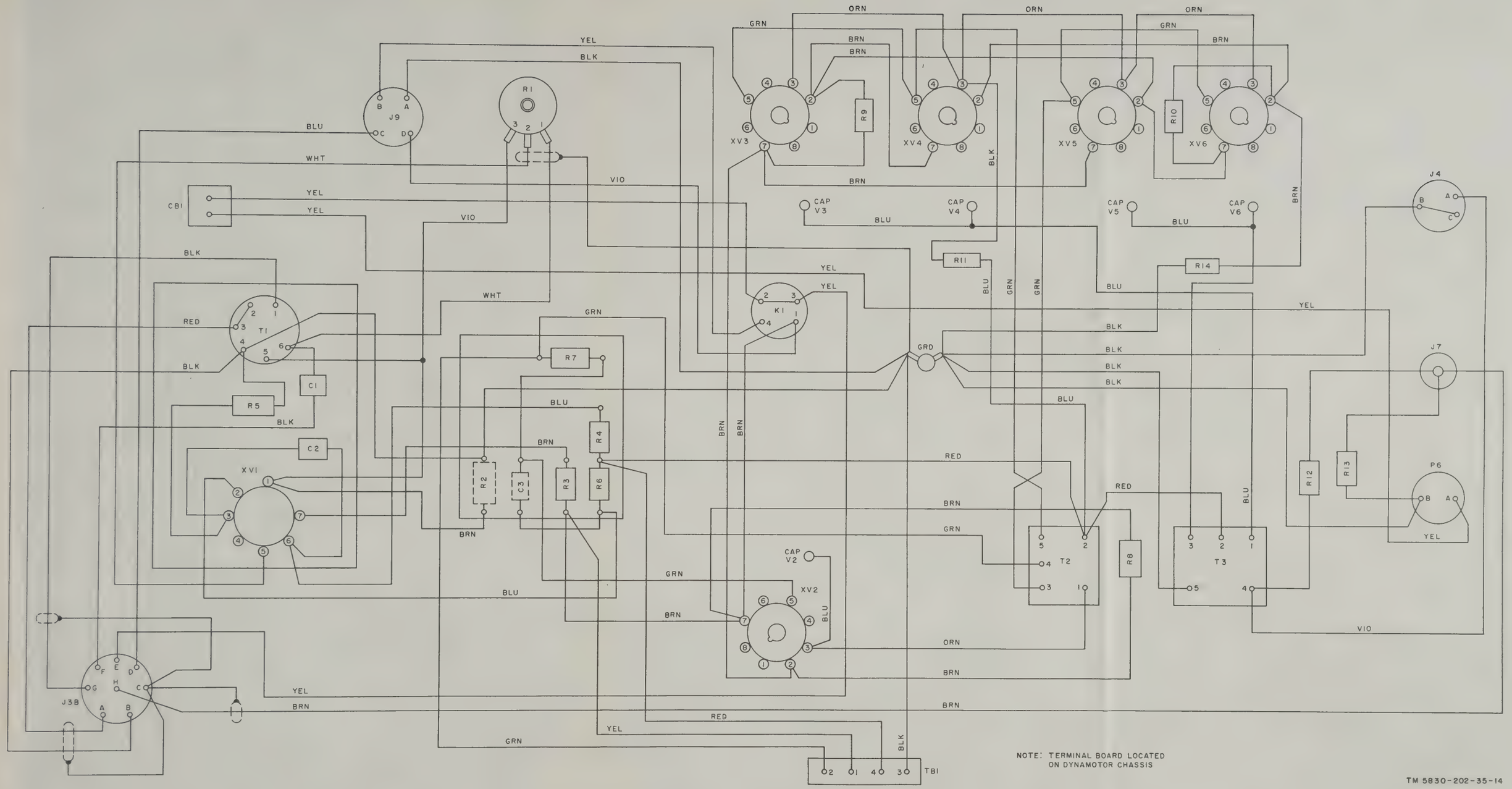


Figure 16. Audio Frequency Amplifier AM–1830/UIH–1, wiring diagram.

[AG 413.47 (31 Mar 59)]

By Order of *Wilber M. Brucker*, Secretary of the Army:

MAXWELL D. TAYLOR,
General, United States Army,
Chief of Staff.

Official:

R. V. LEE,
Major General, United States Army,
The Adjutant General.

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USA Corps (Res) (1)
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TASSA (15)
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Army Pictorial Cen (2)
USA Ord Missile Comd (3)
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  11–16 (2)
  11–57 (2)
  11–500 AA–AE (2)
  11–587 (2)
  11–592 (2)
  11–597 (2)

NG: State AG (3); units—same as Active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used see, AR 320–50.

☆ U. S. Government Printing Office: 1959—480511